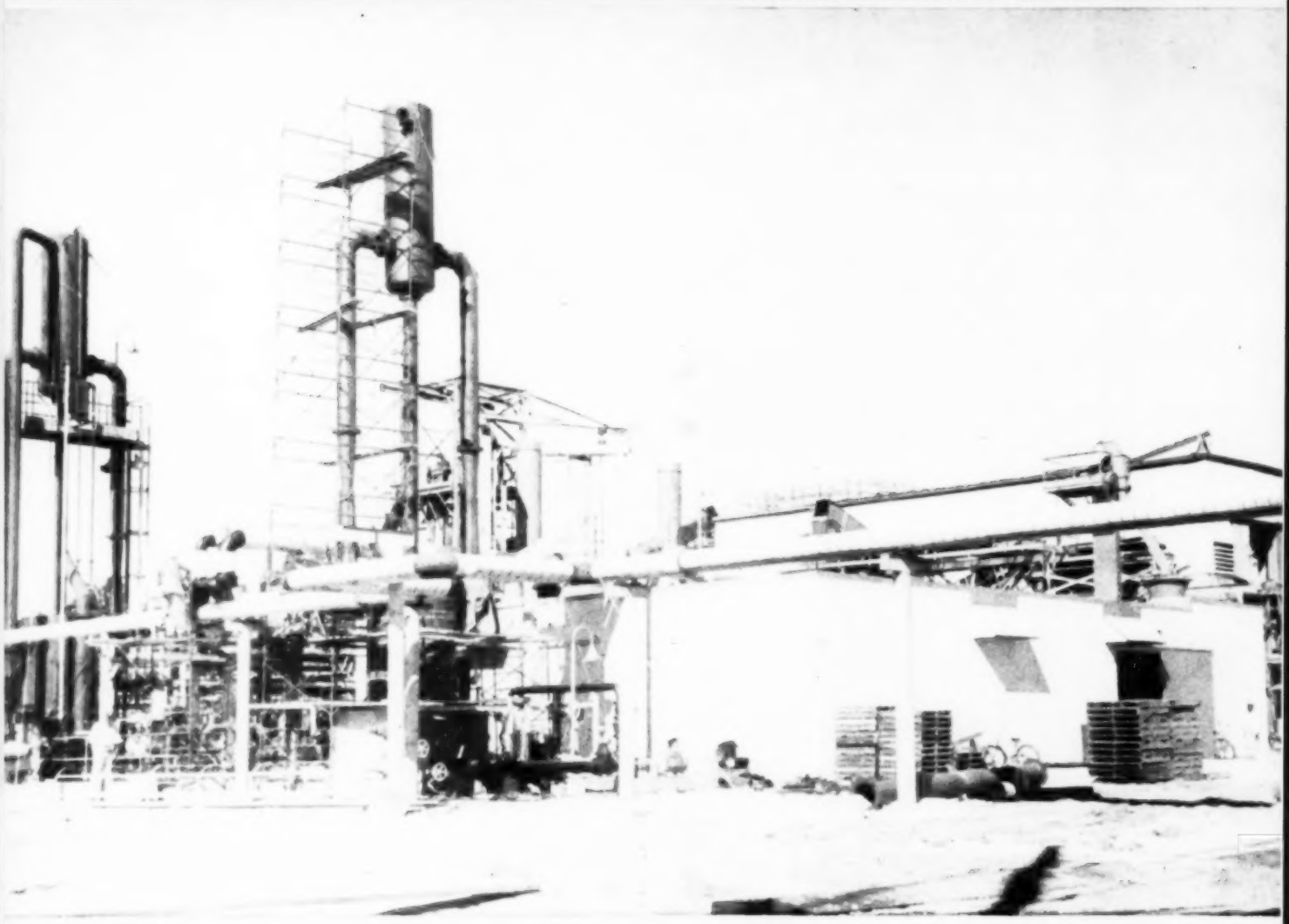
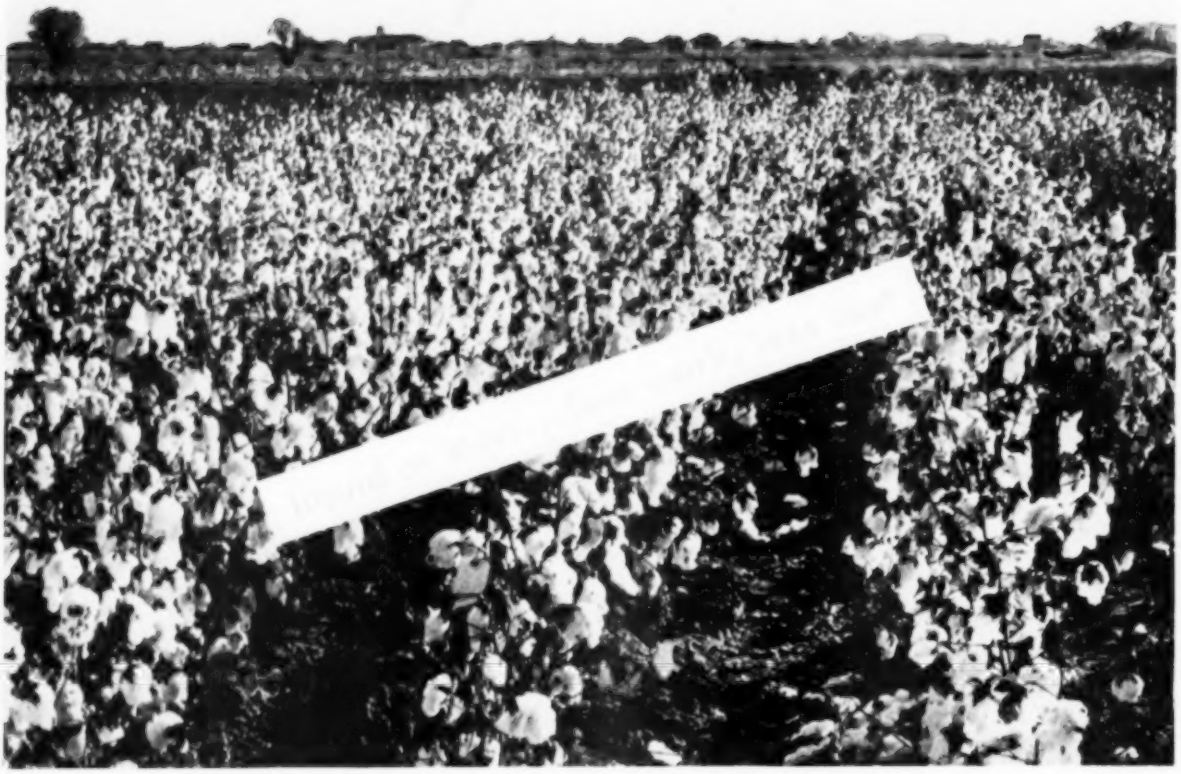
Vol. 8, No. 3 MARCH, 1953

AGRICULTURAL CHEMICALS



In This Issue:

Natl. Agri. Chemicals Assn. Meets • Fertilizer Consumption 22 Million Tons, 1952 • DDT-Bordeaux Mixtures Pesticide Industry Problems (Guest Editorial) • Development of Agricultural Chemicals • Food Flavors Tested New Thompson-Hayward Plant • Maleic Hydrazide for Roadside Use • Midwest Soil Improvement Committee Meets



POWCO BRAND Cotton Concentrates, for *effective* protection of cotton crops, are available as follows:

- **Cotton Dust Concentrates**
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- **Toxaphene-DDT 4-2 Emulsion**
- **Toxaphene Emulsion, 6- & 8-lb.**
- **Toxaphene 40% Dust Concentrate**

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Since 1900, rural America has undergone an agricultural revolution. Many things have contributed to this change. FERTILIZER, the product of one of this country's great industries, has played a major part.

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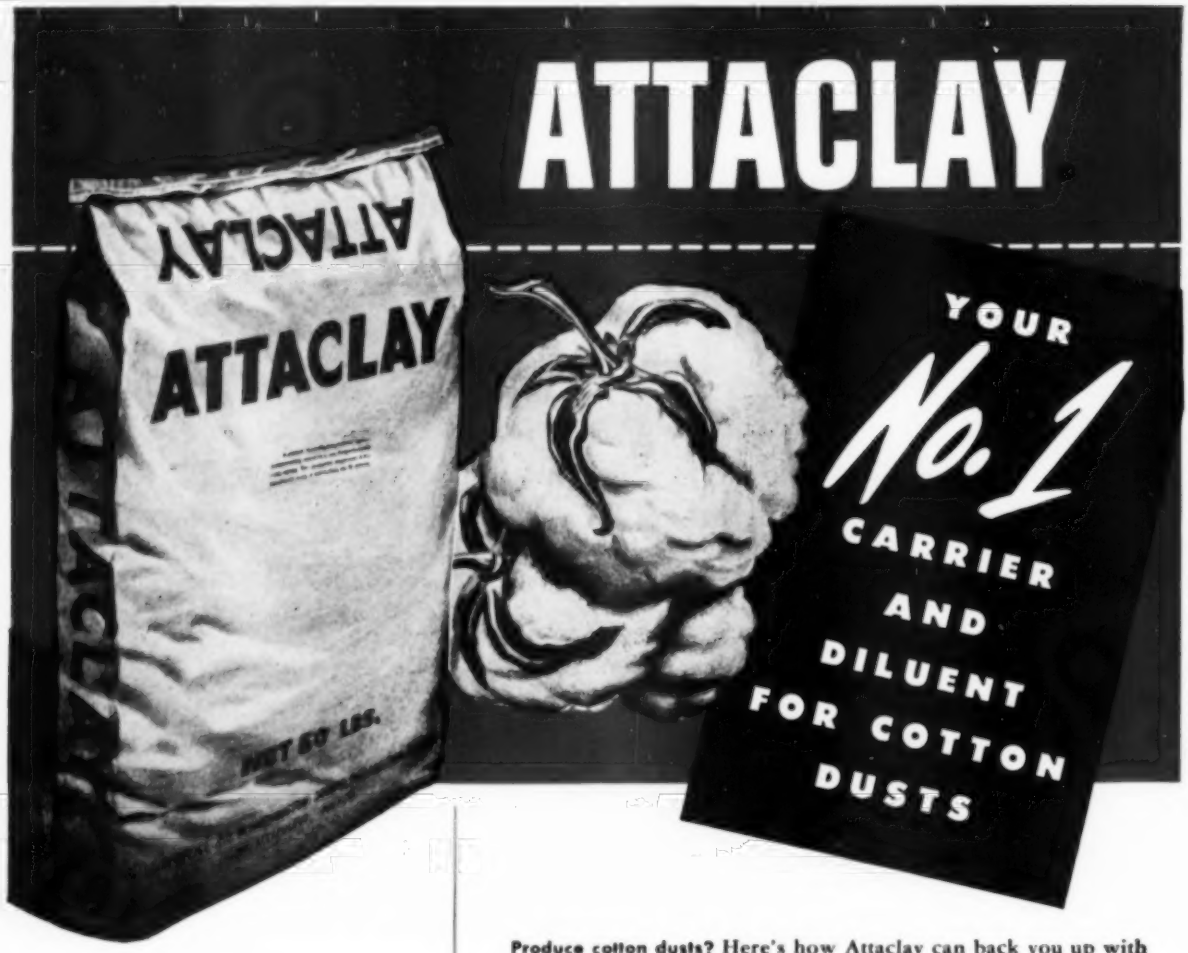

ATTAPULGUS carriers for SOIL PESTICIDES

Granular grades have been developed which have formulating and field application characteristics of particular value in soil insect control. Like "thirsty" Attaclay, these commercially-proved granular grades have great sorptive capacity, insuring easy and effective processing. Excellent coverage results are obtained when applied either from the ground or the air. Particle size ranges to suit all formulations. Write for data sheet and free test samples.

Produce cotton dusts? Here's how Attaclay can back you up with fine carrier and diluent performance at low cost:

FLEXIBILITY. Attaclay is a top-heavy favorite in the following cotton insect control formulations: Toxaphene; DDT-BHC; aldrin and aldrin-DDT; dieldrin and dieldrin-DDT; parathion; heptachlor-DDT; aramite; chlordane-DDT (in areas where recommended). Could you do better than standardize on one carrier which handles them all?

OVER-ALL EFFICIENCY. Attaclay's great sorptive capacity smooths out all types of processing techniques and delivers dry, free-flowing bases. It eases grinding operations with low melting point solids. It permits a one-step procedure when grinding solids in combination. It offers a really satisfactory way to formulate liquid toxicants by direct impregnation. It is highly desirable for direct preparation of field-strength dusts, or for conditioning. You can rely on Attaclay to boost production schedules and enhance product quality.

Cotton dust problems? Let's team up to lick them!

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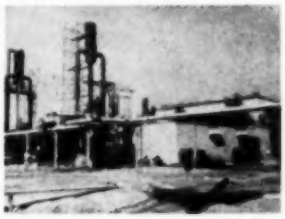

THIS MONTH'S COVER

Evidence is available on all sides that the pesticide industry is prepared to meet the needs of American agriculture for pest control. Here is a partial view of the new BHC facilities of Ethyl Corporation at Baton Rouge, La. Adjacent to the BHC facilities, is Ethyl's new lindane plant, construction of which is nearing completion.

VOL. 8 No. 3
MARCH 1953

A Monthly Magazine For the Trade

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Advertising Manager

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In This Issue:

Editorials 35
Guest Editorial 36
By Arthur W. Mohr
DDT-Bordeaux Mixture on Concord Grapes 37
By James A. Cox
Natl. Agricultural Chemicals Assn. to New Orleans 40
The Development of Agricultural Chemicals 42
By R. H. Wellman
Maleic Hydrazide as Plant Inhibitor 45
By John W. Zukel
Fertilizer Consumption, Preliminary Report 48
By Walter Scholl & Hilda M. Wallace
Tasting Foods for Fungicide Residues 50
By Walter A. Maclinn
Louisiana Pest Control Conference 53
Midwest Soil Improvement Meeting 55
By H. H. Slawson
North Carolina Boll Weevil Situation 57
Suppliers' Bulletins 59
Washington Report 61
Thompson-Hayward Opens New Plant 62
Potash Supplies Sufficient 63
Industry News 85
Technical Briefs 98-D
The Listening Post 99
By Kelvin Dorward and Paul R. Miller
Industry Meeting Calendar 113
Industry Patents and Trade Marks 119
Classified Advertising 157
Advertisers' Index 161
Tale Ends 162

AGRICULTURAL CHEMICALS

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Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

NEW!

for IMPROVED STACKING, PALLETIZING and MATERIAL HANDLING

UNION'S NON-

ECONOMICAL
The most economical bag with a built-in NON-SKID.

MORE PROTECTION
Curtails breakage due to bags falling from fork trucks and stacks.

LABOR SAVINGS
Fewer man-hours needed to clean up contents of broken units; easier handling.

MOVE FREELY
Manufactured to flow on chutes and conveyors.

ADAPTABLE
Special coating is controllable. Like all Multiwalls, it is custom-engineered for each use.

TRANSPARENT
Coating shows inks and stock to full advantage.

EASY TO SEW
Tops of bags may be kept free of coating.

SHIP BETTER
Resist rough handling. Less tendency to slide and chafe in transit.

WON'T ADHERE
Bags will not stick to each other in bundles.

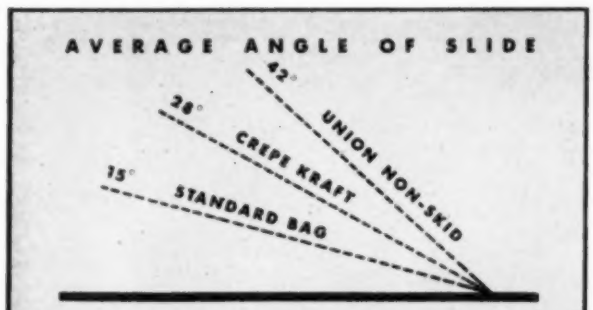
UNIFORM STACKING
No variation. Provides completely dependable stacking qualities.

PLEASES YOUR CUSTOMERS
Reduces likelihood of transit damage due to load shifts; cuts down complaints.

LESS REPROCESSING
Less breakage and spilling means less rehandling of product.

-SKID MULTIWALL BAGS

Sprayed-on coating reduces skidding effectively



Union's *NON-SKID* holds firm at three times the angle. In standard laboratory tests to determine non-skid characteristics, scales connected to tilt tables measure the degree of angle required to make bags slide off. Union's new NON-SKID bag has a minimum slide angle of 42°, far superior to any other bag.

Union's brand-new
NON-SKID Multiwall Bag
guarantees better performance at
every stage of your
packaging, storage and shipping operations
where skid control is essential.

Union's *NON-SKID* is a
performance-proved Multiwall
with the addition of
an exclusively developed resin-like emulsion.
Almost invisible to the eye,
this new spray makes this the first
all-way NON-SKID Multiwall.

This new bag delivers a far greater *non-skid* rating in every direction . . .
even greater than bags made of creped kraft.

Size — Stock — Delivery

Available in Union Multiwalls of all sizes with either a kraft or bleached outer ply. Initial capacity may be limited. Orders will receive priority in order of receipt. Investigate now.

BEST APPLICATIONS

Union's *NON-SKID* is particularly recommended for feed, chemicals, flour, synthetic rubber, starch, fertilizer, insulating materials, and other products in whose packaging material handling is an important consideration.

DRIVER COULDN'T MAKE *NON-SKID* BAGS SLIP OFF!
In one plant test, a gasoline-powered truck was loaded with these bags. The driver was instructed to make them slip off. He started forward at full speed, then applied brakes full force. Although momentarily the truck itself threatened to tip over, the stack of NON-SKID Multiwalls resting on the forks merely leaned slightly, then settled back to their original position.

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& PAPER CORPORATION
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We would like more information on the new Union NON-SKID Multiwall Bag.

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Company _____

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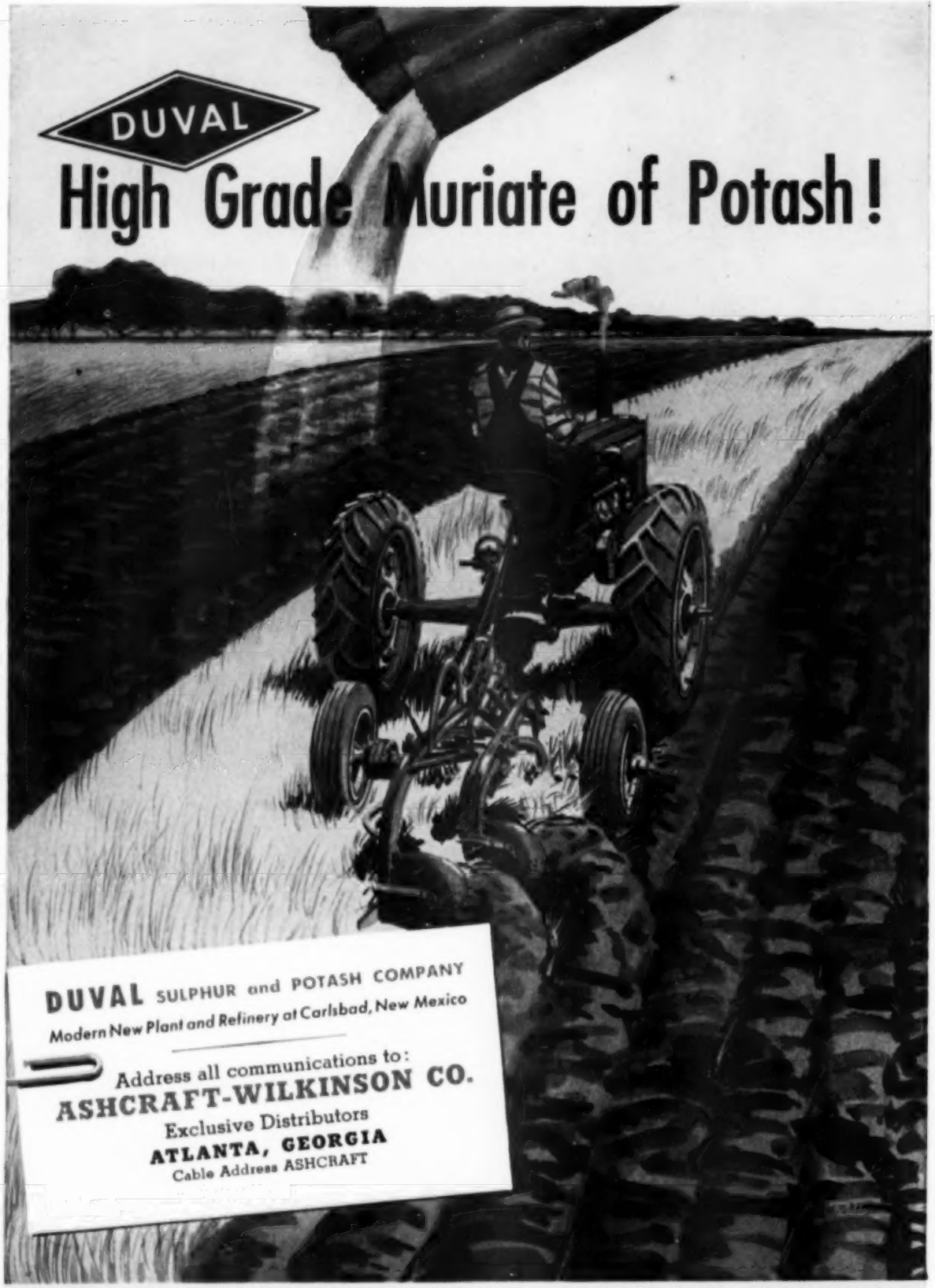
City _____ Zone _____ State _____

AC 353



NORFOLK, VA. • CHARLESTON, S. C. • TAMPA, FLA. • JACKSON, MISS. • COLUMBUS, O.

Important News for Manufacturers of SOIL CONDITIONERS

Producers of soil conditioners should investigate a new, special type of Hercules CMC.

Laboratory studies and field tests indicate that this carboxymethylcellulose compound is effective in aggregating clays and other problem soils.

The cost of Hercules CMC is appreciably lower than that of some other soil conditioner compounds.

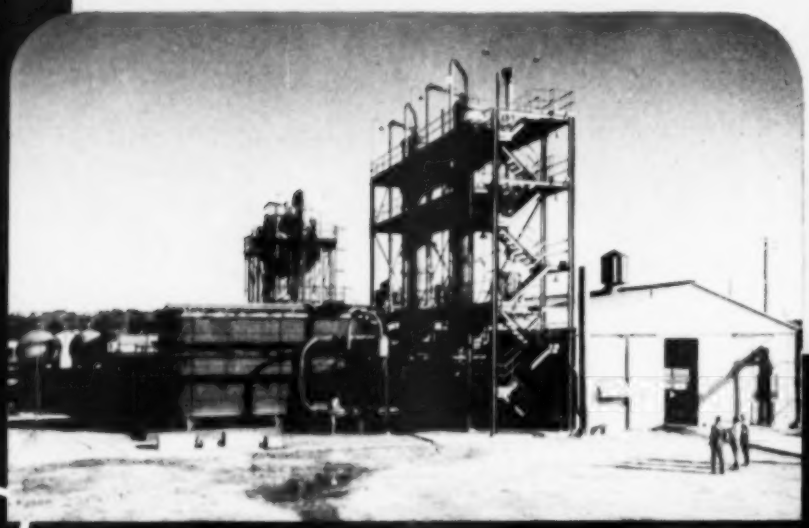
Some manufacturers have already incorporated Hercules CMC in soil conditioners now on the market. Write for details and price information.

HERCULES® CMC

Cellulose Products Department
HERCULES POWDER COMPANY
Wilmington 99, Delaware

CM53-6

These two nitric acid plants at Sterlington, La. were designed and built by C & I for Commercial Solvents Corp. Completed in 1952, the plants can produce a daily total volume of 120 tons of nitric acid, for use in the production of fertilizers.



"Build three more just like 'em"

says COMMERCIAL SOLVENTS CORP.

The best testimonial is a repeat order. That's why C & I is proud of the fact that 3 more plants like these recently erected ones have been ordered by Commercial Solvents Corp. When completed, total capacity of the five lines will be better than 300 tons of nitric acid per day.

In recent years, over 90% of U. S. nitric acid plants have been built by C & I. With its vast experience in engineering, design, and construction, C & I delivers your nitric acid plant at a FIXED COST . . . on a FIXED DATE. Sizes range from 10 to 200 tons per day.

C & I is also prepared to build Neutralizer, Ammonium Nitrate and Complex Fertilizer plants.

Specialists in the Processing of Anhydrous Ammonia

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For economy . . .
For better field performance of agricultural emulsions use

TRITON X-150

TRITON X-160

Individually or in combination, these new TRITON emulsifiers provide important advantages to both formulators and growers.

FORMULATORS will be interested in these important properties:

Versatility in emulsifying a wide variety of toxicant-solvent systems; thus emulsifier inventory can be kept to a minimum.

Effectiveness at low concentrations; therefore, finished formulations are more economical.

GROWERS will appreciate these advantages in the field performance of concentrates formulated with TRITON X-150 and TRITON X-160:

Excellent spontaneity

Stability of emulsions with waters of varying hardness.

Write for samples and for technical bulletin AG-13. This bulletin gives more detailed information on the application of TRITON X-150 and TRITON X-160.

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75% DDT WETTABLE POWDER

when you want it promptly

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Strategically located in the midwest agricultural area, Michigan Chemical is a basic producer of DDT for Agricultural use. This, together with favorable transportation facilities, assures you a most satisfactory source. Just as a trial, place your next order with Michigan Chemical. You'll get results that surpass promises.

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The CHALLENGER can be used to spray water base insecticides as well as oil base liquids! The Challenger's adjustable control enables the spray to be delivered in either aerosol fog or wet residual form. Can be set to spray anywhere *from 1 quart up to 5 gallons per hour!* Equipped with automatic timer if desired.

The CHALLENGER is unsurpassed for rugged performance and is fully guaranteed! Here is a sprayer that can "take it" day in — day out, year in — year out and still out-perform the others!

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- *Completely Automatic!*
- *Dispenses up to 5 gal. hour!*
- *No steam, pump or water!*
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- *Precision Built!*
- *Fully Guaranteed!*

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Firm .....

Address .....

City ..... State .....

James Varley & Sons INC.

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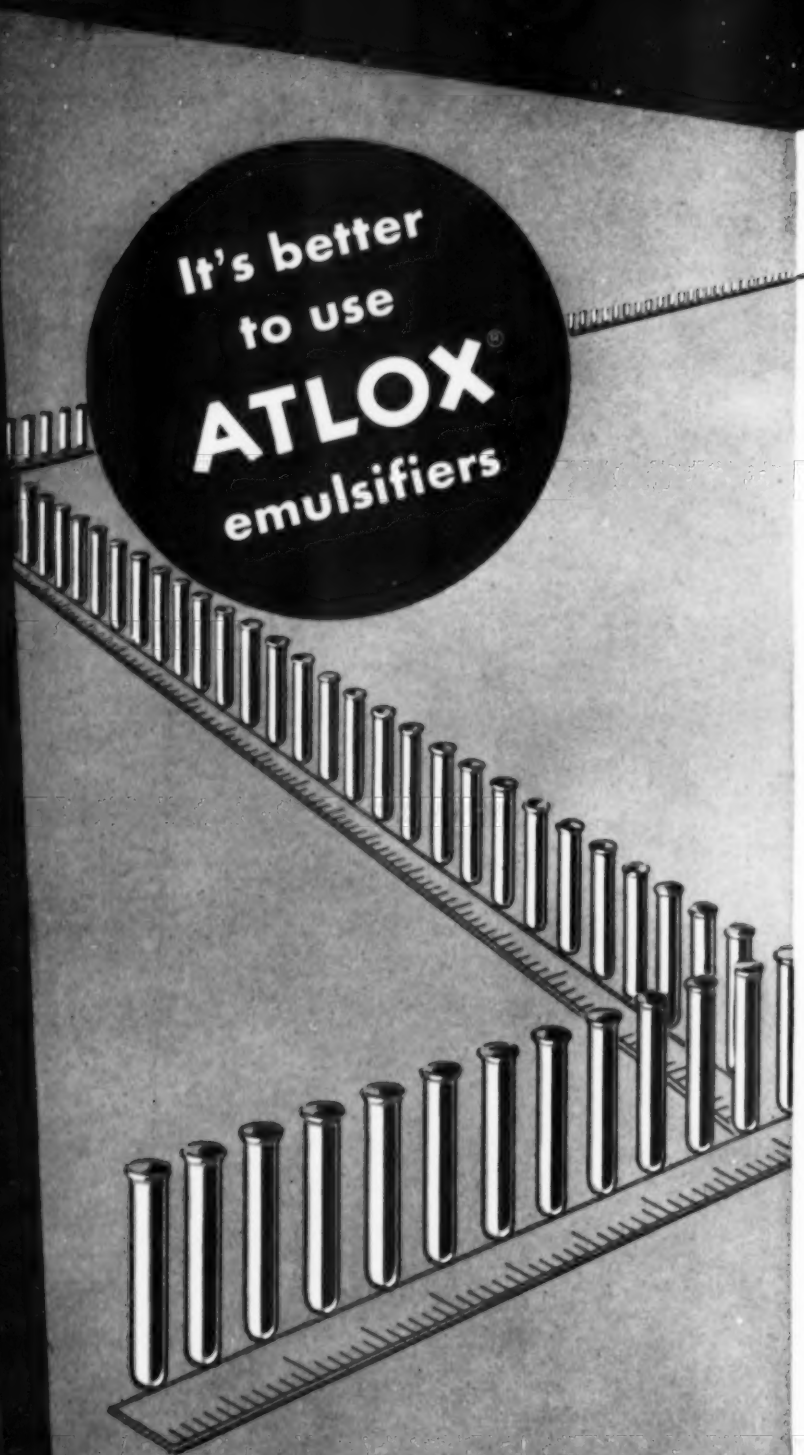

because...

they offer the widest selection

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ATLOX emulsifiers offer a broad selection of affinity for water and organic solvents . . . choice of dispersion, suspending, anti-dusting, wetting and anti-foaming actions.

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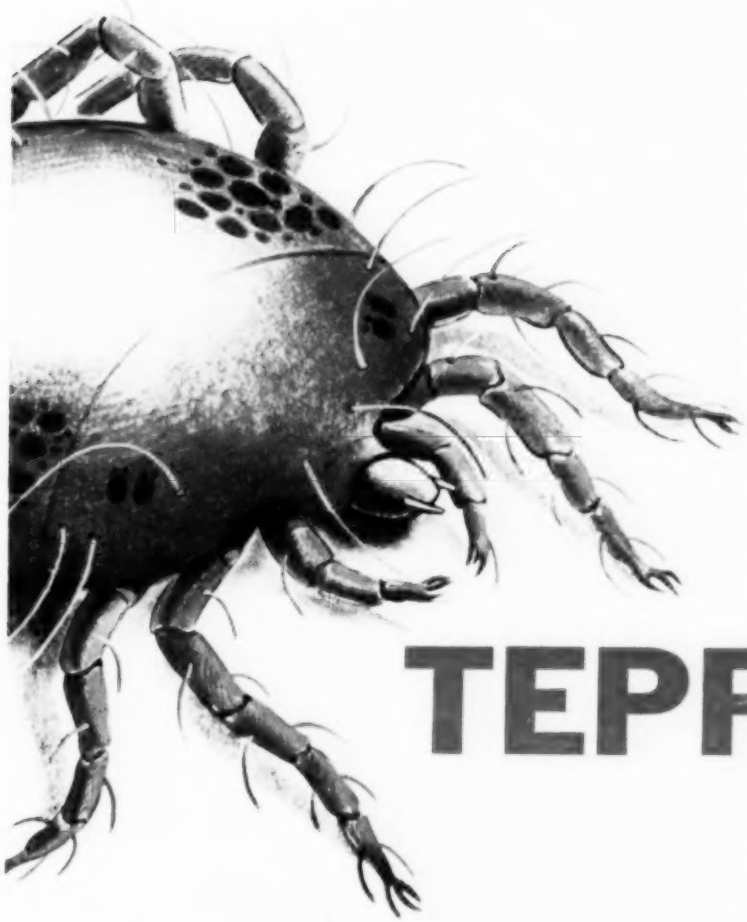
BRANTFORD, CANADA

use TEPP* for low-cost effective control of

red spider mites
aphids
flea beetles
thrips
leafhopper nymphs
cabbage caterpillar
AND MANY OTHER PESTS



Some users are saving from ⅓ to ½ of the cost of insecticides and insecticide application by using TEPP exclusively. With efficient TEPP, fewer applications are needed and crop losses are reduced to a minimum.

Another big advantage of TEPP is that it kills pests but leaves no poisonous residue. Farmers spray one day and harvest poison-free crops 48 hours later! Swift-acting, powerful TEPP stops those last-minute infestations that can devastate a fine crop.

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means pest-free crops

poison-free crops

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KINGSPORT, TENNESSEE

Sales representative for **TENNESSEE EASTMAN COMPANY**, division of **EASTMAN KODAK COMPANY**

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for
insecticides
weed killers
brush killers

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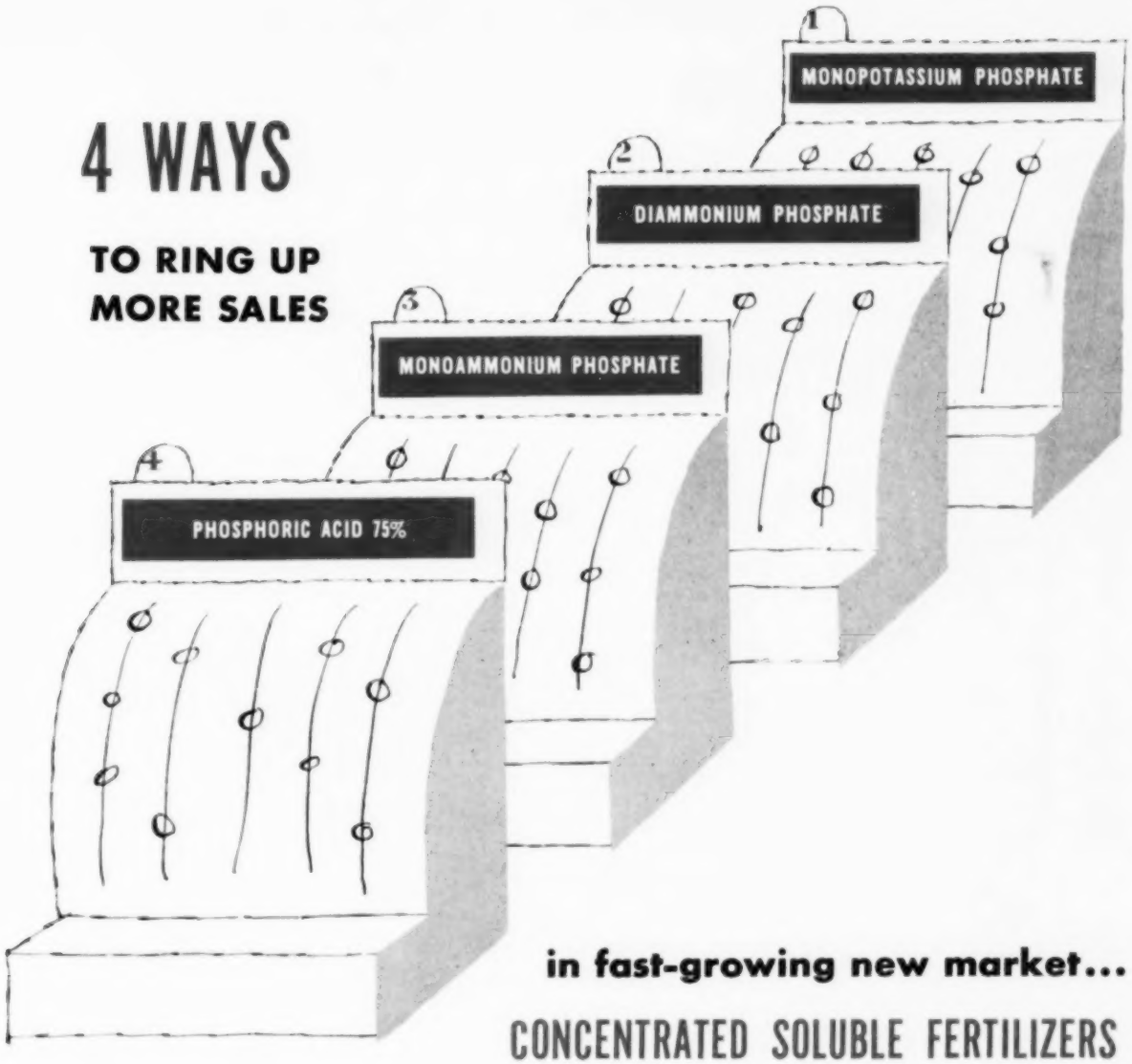
4 WAYS

TO RING UP MORE SALES



in fast-growing new market...

CONCENTRATED SOLUBLE FERTILIZERS

Current market reports clearly show the heavy swing to soluble fertilizers by a wide variety of agricultural and home gardeners.

Alert formulators are moving into this profitable, fast-growing market *now*. Monsanto helps them—as it can help you—by furnishing concentrated nutrients that are pure, soluble and easily compounded.

You'll find these high-quality materials will mean plenty of repeat business for you because they give your customers these important advantages:

Easy to apply—to use, just add water and apply with standard garden equipment.

Efficient to use—nutrient benefits are readily available to plant.

Versatile—use for leaf feeding, starter solutions, seed treatment or side dressing.

Simple to handle—concentrated form makes lightweight, compact shipments.

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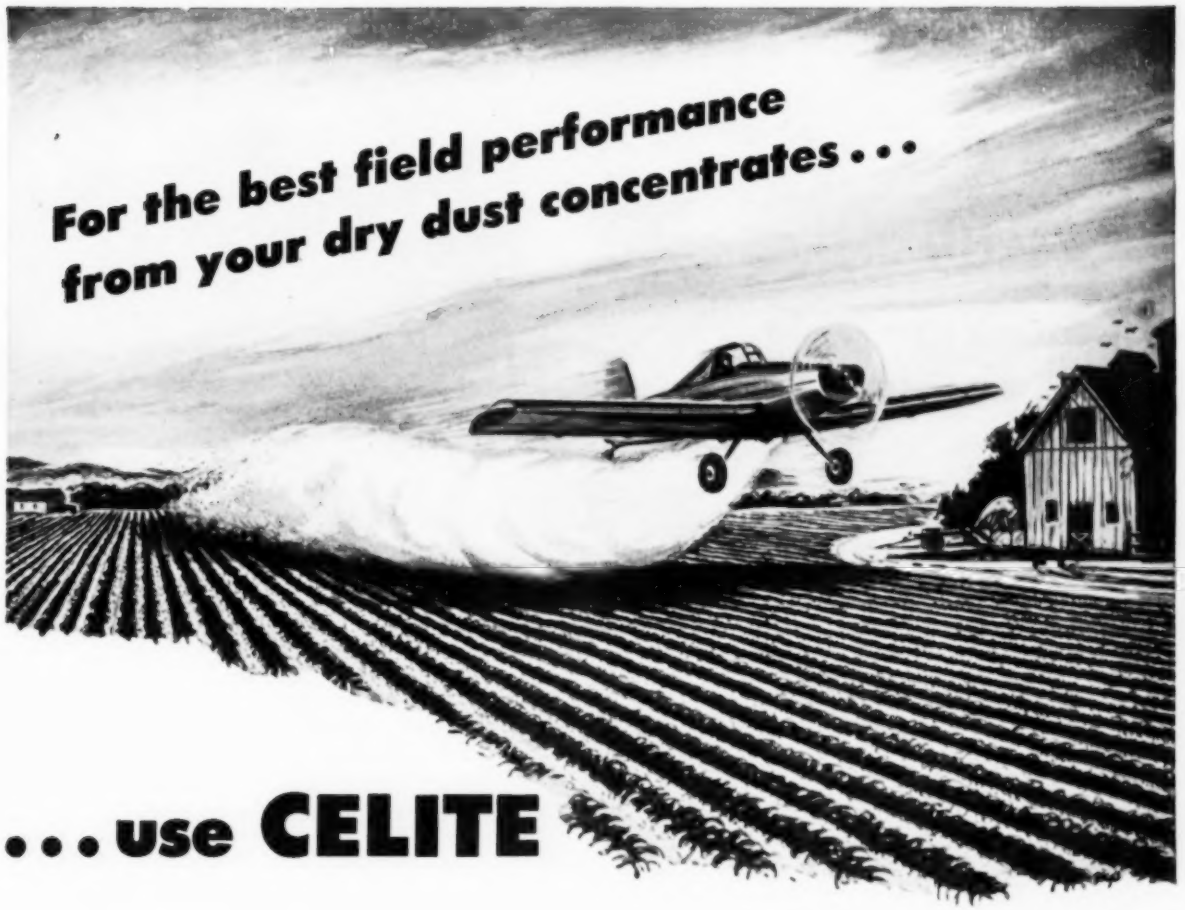

YOUR dry dust concentrate will give top field performance—even though dense let-down agents have been added—when you use Celite.

You'll find that the presence of a small percentage of Celite—because of its great bulk per unit of weight, and the irregular shape of the individual particles—fluffs up the final dust and helps neutralize the effect of heavy extenders. Better dispersion in the field is thereby assured . . . at very little cost.

Celite offers other advantages, too:

As a Grinding Aid: Celite aids in grinding of both solid and semi-solid low melting point poisons and makes a more potent dry dust concentrate.

As an Absorption Medium: Celite's high liquid absorption capacity allows a higher percentage of liquid poison to be absorbed while still maintaining a "dry" dust. This gives you a highly concentrated product, and lower packaging and shipping costs.

The use of Celite as a diluent and grinding aid can well be a profitable one for your operation. For additional information, write to Johns-Manville, Box 60, New York 16, N. Y.

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FINENESS: Approximately 100% through 325 mesh
DENSITY (Vibrated): 11 pounds per cubic foot
BULK: Celite bulks much higher than most diluents
ABSORPTION: 200% of its weight of water
300% of its weight of kerosene
pH VALUE: Below 7.0
INERTNESS: Compatible with insecticide and fungicide poisons
SUSPENSION: Excellent in both air and water
COMPOSITION: Celite is amorphous diatomaceous silica (SiO_2)

Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

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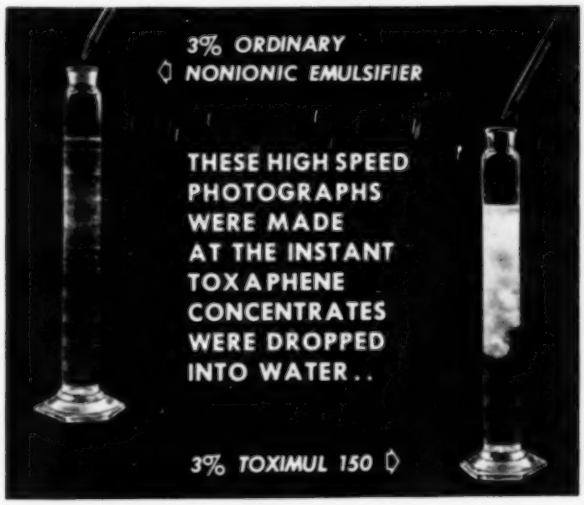
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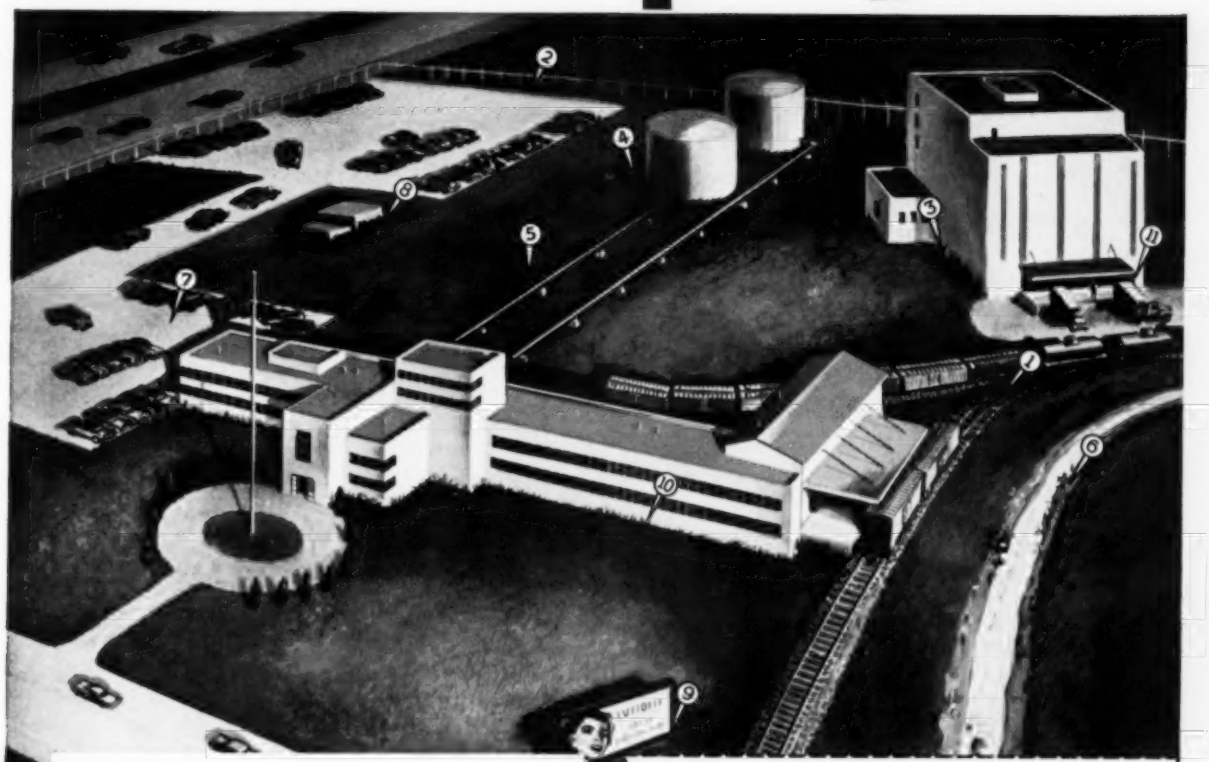

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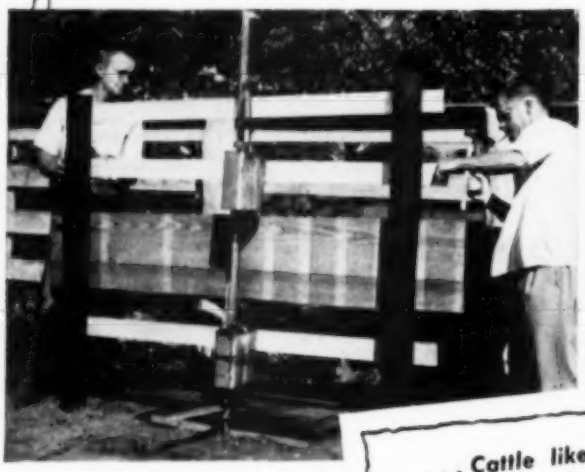

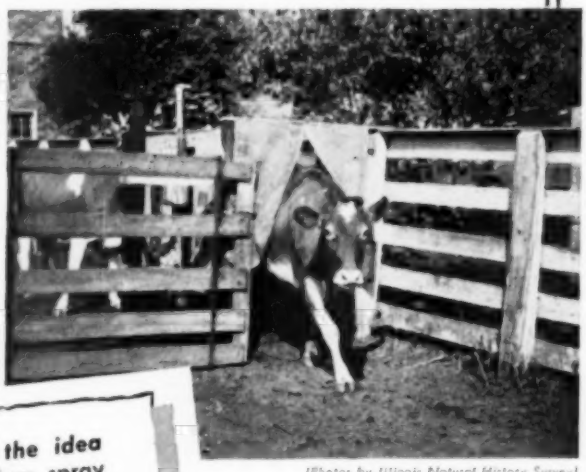

(Photos by Illinois Natural History Survey)

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(From Progressive Farmer —Sept. 1952)

Developed by the Illinois Natural History Survey, the automatic sprayer technique is one of the fastest growing developments in the insecticide industry. Hundreds of sprayers have been installed from coast to coast, and the response from farmers indicates they like the convenience and effectiveness of this method.

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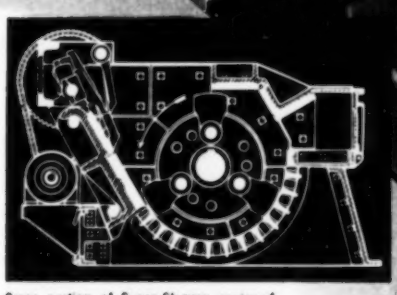

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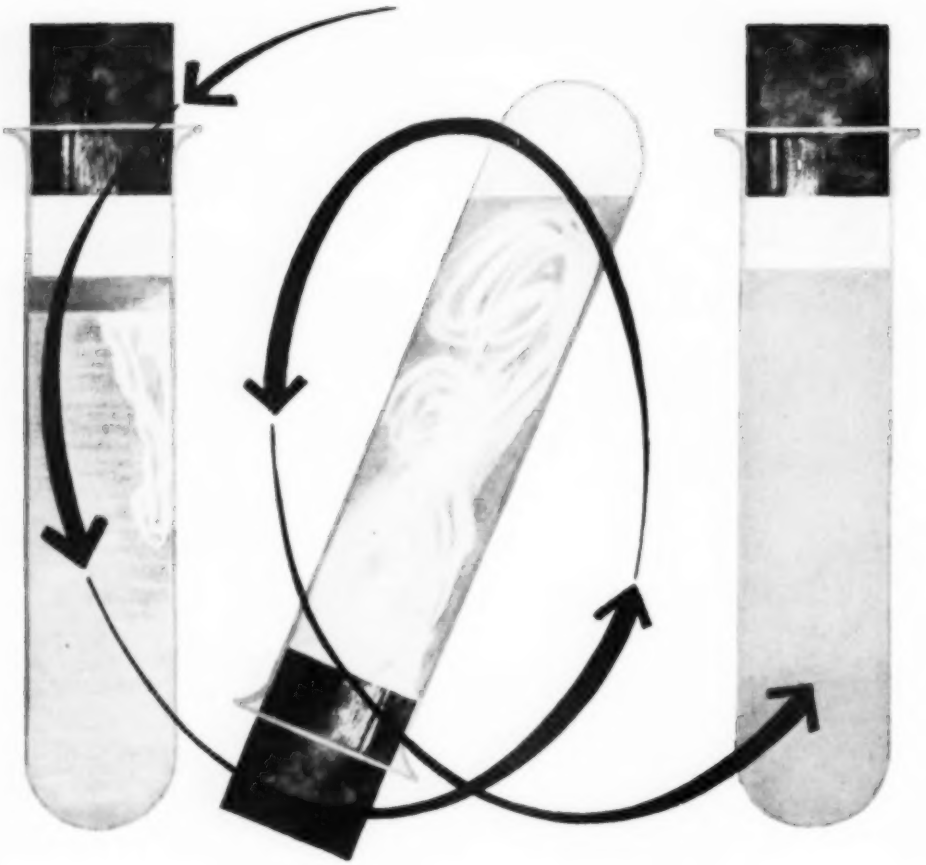

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THE TWO PHOTOGRAPHS ABOVE WERE MADE ON THE SAME DAY IN THE SAME AREA. — The trees on the left were fertilized with 5-10-10 fertilizer without trace minerals; the adjoining trees on the right received the same fertilizer plus soluble trace minerals. The same amount of fertilizer was used on each block. These photographs were taken after harvest.

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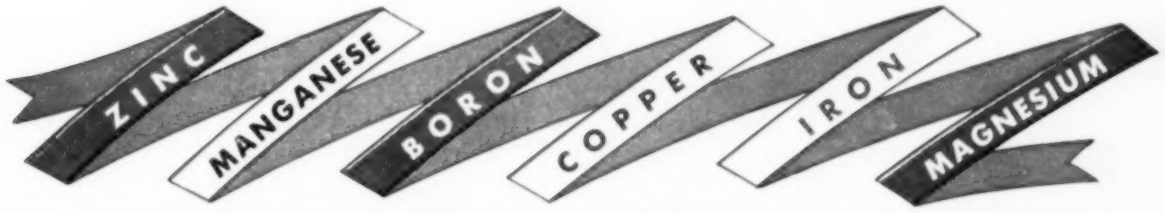

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Write for free table prepared by American Cyanamid Company for calculating fertilizer formulas. This table shows at a glance how many pounds of raw material of a given grade are needed to produce a ton of goods with the analysis desired.

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Editorial
COMMENTS

A POTENTIALLY serious situation faces the pesticide industry and growers alike as the 1953 season approaches. The villain in the act seems to be complacency on the part of pesticide users who figure that if there is such a big stock of materials on hand, why bother with buying the season's requirements early? Such an attitude might make sense in other fields, but it is a mighty risky philosophy to pursue when dealing with the probabilities of large infestations of insects in 1953.

Although warehouses are reported to be well-stocked with materials left over from 1952, continued delay on the part of buyers in placing orders can plug up the supply line just as surely as any other production hindrance. The carry-over from last year was heavy, true. But the supply from this source certainly is not sufficient to stem a heavy infestation of agricultural pests. Yet the presence of these stocks in warehouses creates a hazard both physical and psychological, giving the impression of plenty when there is actually a potential lack.

Memories don't have to be too long to recall situations where sudden demands for large quantities of insecticides could not be met in time. The bugs don't wait. Their devastation is accomplished within an amazingly short time and any control program must be prompt in getting under way and swift in execution. The right material must be on hand at the right time, and certainly, there is no time then to wait for more goods to be manufactured. The pesticide industry can hardly be criticized if such a situation should develop in 1953.

In his guest editorial appearing elsewhere in this issue, the NAC Association president discusses some of the pitfalls peculiar to the pesticide trade. He makes the point that the business is often at the mercy of unpredictable factors of weather, insect populations and competition . . . but the present situation is one which the industry might alleviate to a considerable degree.

A selling job must be done all over again, pointing out to users the chances they are taking in postponing ordering pesticide supplies. Some distributors and formulators might also be in a position to take part of their requirements now, too. At any rate, every possible effort must be expended to overcome buyer resistance, part of which is no doubt caused by the downward price trend.

TWENTY-TWO million tons of fertilizer consumed in the U. S. in 1951-52! That is the estimated total just announced by the U.S.D.A. It marks an increase of 6.8% over the previous fiscal year, itself a new high by more than 2 million tons!

With the use curve pointing upward for the past ten years (except for a very slight drop in 1950), observers are speculating on when the increase will end. With farm income on the downgrade, will growers continue their fertilization programs as before?

We think they will. Fertilizer is still the best investment a grower can make and bankers are being alerted to the soundness of loans for fertilizer since it cuts unit costs of production. This is particularly essential when higher costs and lower income are pressing the grower.

Guest Editorial Written Especially for This Issue of Agricultural Chemicals

Pesticide Industry's Problems Become Acute

by

Arthur W. Mohr

President, California Spray-Chemical Corporation, Richmond, California; President, National Agricultural Chemicals Association

THE pesticide industry has always had unique problems not common to the average business and particularly to the industrial chemical business. There are two inherent fundamentals of this market which rather completely differentiate it from the normal business. They are:

1. A very short use season.
2. A large variation in requirements for a specific marketing area.

The full effect of these basic fundamentals has not been experienced during the past few years because, in general, demand for pesticides has exceeded supply. Since World War II, many new and effective chemicals have entered the fiield and have almost entirely displaced the old materials. Manufacturers have felt their way cautiously by first building pilot plants, or small manufacturing plants, and as the market for the new products seemed more definitely assured, plant capacities were gradually increased. During most of the same period, agriculture was called on for all-out production.

Because of cautious manufacturing capacity expansion and the abnormally expanded agricultural activity, the result was that demand generally exceeded supply. Under these conditions, the threat of shortages kept materials moving through distribution channels on an unusually uniform year-round basis. It was a happy experience for the industry. Everyone hoped it would continue. Possibly newcomers to the agricultural chemical business regarded it as normal.

Conditions in 1953 have completely changed in that new manufacturing facilities completed in 1951 and 1952 have expanded the production to a point that supply now greatly exceeds demand in the case of many of the newer chemicals. Off-season purchases have dropped to a very low figure. The full effect of the inherent fundamentals of short use season and uncertainty of use requirements is being felt fully. The grower has no fear of shortage. He doesn't know how much of any chemical he needs until the pests actually strike, so will not order from the dealer until he definitely needs material. This reticence to order naturally penetrates the distribution chain of dealers and distributors. Let's take a realistic look at the basic fundamentals which bear so heavily on the industry.

(*Turn to Page* 145)

How Growth and Yield of Concord Grapes are Affected by

DDT-Bordeaux Mixes

By James A. Cox
Pennsylvania State College
State College, Pa.

ALTHOUGH there are several species of insects attacking the grape, only the grape berry moth, *Polychrosis viteana* Clemens, and the grape leafhopper, *Erythroneura comes* Say, are considered of economic importance in the Erie Grape Belt. Before the advent of DDT, sprays of lead and calcium arsenate were used in the early part of the season and fixed nicotine sprays later in the season, to combat grape berry moth. To control grape leafhoppers, nicotine sulphate was added to the early grape berry moth sprays. These control measures gave a rather low degree of control, so consequently many vineyards were severely injured year after year.

Since 1944, experiments have been underway with DDT and other insecticides for control of grape insects. During this time, several workers have shown that sprays of DDT are effective against the grape berry moth and the grape leafhopper. In New Jersey, Fleming and Maines (1947) have shown that sprays of DDT were more effective for grape berry moth control than sprays of lead arsenate. Taschenberg, (1948) (1949) working in New York, has conducted experiments for control of grape berry moth and grape leafhopper and has shown DDT to be very effective against these pests. Cox (1945) (1947) (1949) has reported that sprays of DDT gave satisfactory control of grape berry moth and grape leafhopper. It will not be necessary to discuss in detail the work of these investigators. However, it should be mentioned that satisfactory control of severe infestations of grape berry moth require three applications of DDT, at the rate of 12 to 16 ounces of the toxicant to 100 gallons. In some instances, light infestations of grape berry moth may be controlled with two applications of DDT, one spray for the first brood and one for the second brood. The grape leafhopper has been controlled effectively with one application of DDT, at a concentration as low as 4 ounces of the toxicant to 100 gallons. DDT appears to be toxic to the adult hoppers as well as the nymphs, and preblossom sprays appear to be equal in effectiveness to post-blossom applications. Since the grape berry moth is the more difficult pest to combat, little or no attention is given to the control of grape leafhopper.

Table 1
Description of the spray schedules for the various treatments.

Treatment number	Post blossom sprays		
	After the berries set	10 days after the berries set	Late July or early August
1	No spray	No spray	No spray
2	Bordeaux mixture 4-4-100 Spreader, 1 qt. (1)	Bordeaux mixture 4-4-100 Spreader, 1 qt.	Bordeaux mixture 4-4-100 Spreader, 1 qt.
3	50% DDT, 1.5 lbs. Spreader, 1 qt.	50% DDT, 1.5 lbs. Spreader, 1 qt.	50% DDT, 1.5 lbs. Spreader, 1 qt.
4	50% DDT, 1.5 lbs. Bordeaux mixture 4-4-100 Spreader, 1 qt.	50% DDT, 1.5 lbs. Bordeaux mixture 4-4-100 Spreader, 1 qt.	50% DDT, 1.5 lbs. Bordeaux mixture 4-4-100 Spreader, 1 qt.
5	50% DDT, 1.5 lbs. Ferbam, 1.5 lbs. Spreader, 1 pt.	50% DDT, 1.5 lbs. Ferbam, 1.5 lbs. Spreader, 1 pt.	50% DDT, 1.5 lbs. Ferbam, 1.5 lbs. Spreader, 1 pt.
6	50% DDT, 1.5 lbs. Ferbam, 1.5 lbs. Spreader, 1 pt.	50% DDT, 1.5 lbs. Ferbam, 1.5 lbs. Spreader, 1 pt.	50% DDT, 1.5 lbs. Bordeaux mixture 4-4-100 Spreader, 1 qt.
7	50% DDT, 1.5 lbs. 26% Tribasic copper sulphate, 3 lbs. Lime, 3 lbs. Spreader, 1 qt.	50% DDT, 1.5 lbs. 26% Tribasic copper sulphate, 3 lbs. Lime, 3 lbs. Spreader, 1 qt.	50% DDT, 1.5 lbs. 26% Tribasic copper sulphate, 3 lbs. Lime, 3 lbs. Spreader, 1 qt.

Table 2

Summary of data for 1952 showing size of berries and clusters and the number of clusters per vine of grapes treated with various spray programs.

Treatment number	Average weight per 100 berries (grams)	Average weight per cluster (pounds)	Average No. clusters per vine
1	306.5	0.170	77.0
2	260.8	0.164	70.9
3	293.5	0.174	76.6
4	280.4	0.165	57.4
5	301.1	0.180	81.6
6	289.1	0.175	79.8
7	291.5	0.172	75.4
Differences required for significance at			
1% level	21.10	0.012	14.5
5% level	15.40	0.009	10.6

FIGURE 1

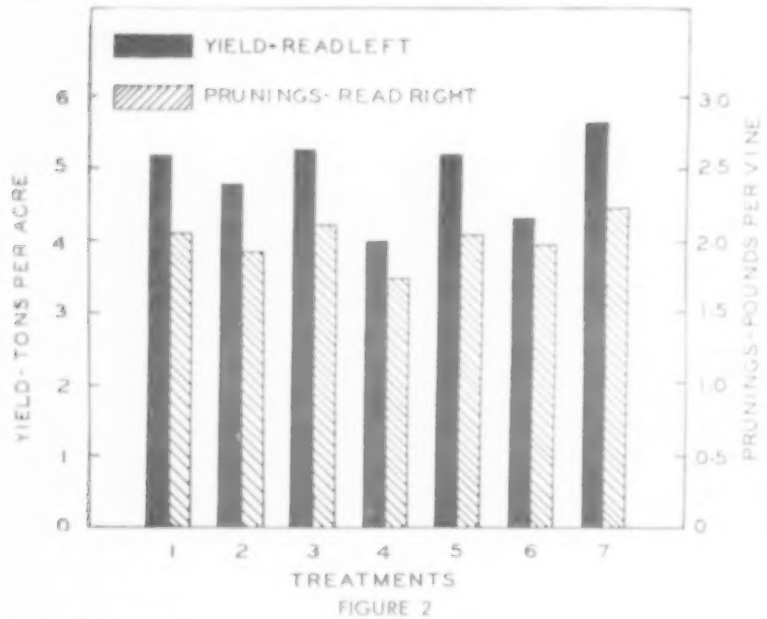
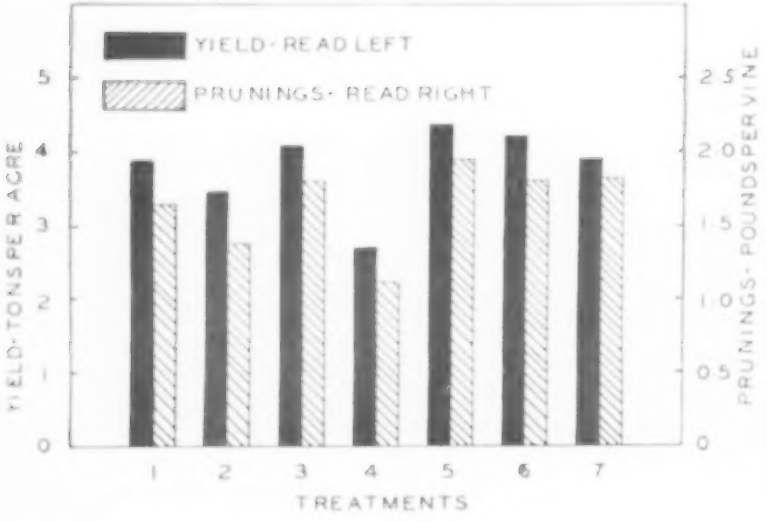


FIGURE 2



What Causes Injury?

ALTHOUGH sprays of DDT have been outstanding for the control of grape insects it has been observed that the standard spray program (DDT and bordeaux mixture) has resulted in considerable foliage injury to Concord grapes. During the season of 1950, foliage injury was quite pronounced on grapes treated with DDT and bordeaux mixture sprays. Grapes sprayed with DDT and ferbam showed little or no foliage injury. In view of this, experiments were started in 1951 to determine whether or not certain sprays were capable of causing economic damage to Concord grapes. And if so, what is the nature and extent of the damage. This report is a summary of the results for 1951 and 1952.

Methods and Materials.—The experiments were conducted in a commercial vineyard at North East, Pennsylvania. This vineyard was located on Chenango gravelly sandy loam soil and was planted to the variety Concord. The vines were spaced 8 by 9 feet and were trained to the umbrella system. The cultural treatment was clean cultivation during the summer, followed by a winter cover of domestic rye grass. Early in the spring before the vineyard was plowed, a 10-10-10 fertilizer was applied to the entire treated area, at the rate of 500 pounds per acre, plus a second application of a 10-10-10 fertilizer, at the rate of 200 pounds per acre, applied to the vineyard just before seeding the cover crop.

The test plots were three rows wide and 21 to 24 vines long. The plots were replicated four times and the positions of the plots within the blocks were left to chance. Individual records of pruning weights and fruit yields were obtained from each of the count vines in the center row of each plot. The data shown in this report of vine growth and yields of fruit are based on the average annual pruning weights and pounds of fruit per vine for all the replicates in each treatment.

A system of balanced pruning was used on each count vine. The

number of buds left on the selected canes of each vine for the following year's fruit production and growth was determined from the amount of growth the vine had made the previous year. The pruning scale was 30 buds for the first pound of prunings (one-year growth) and 12 buds for each additional pound of prunings.

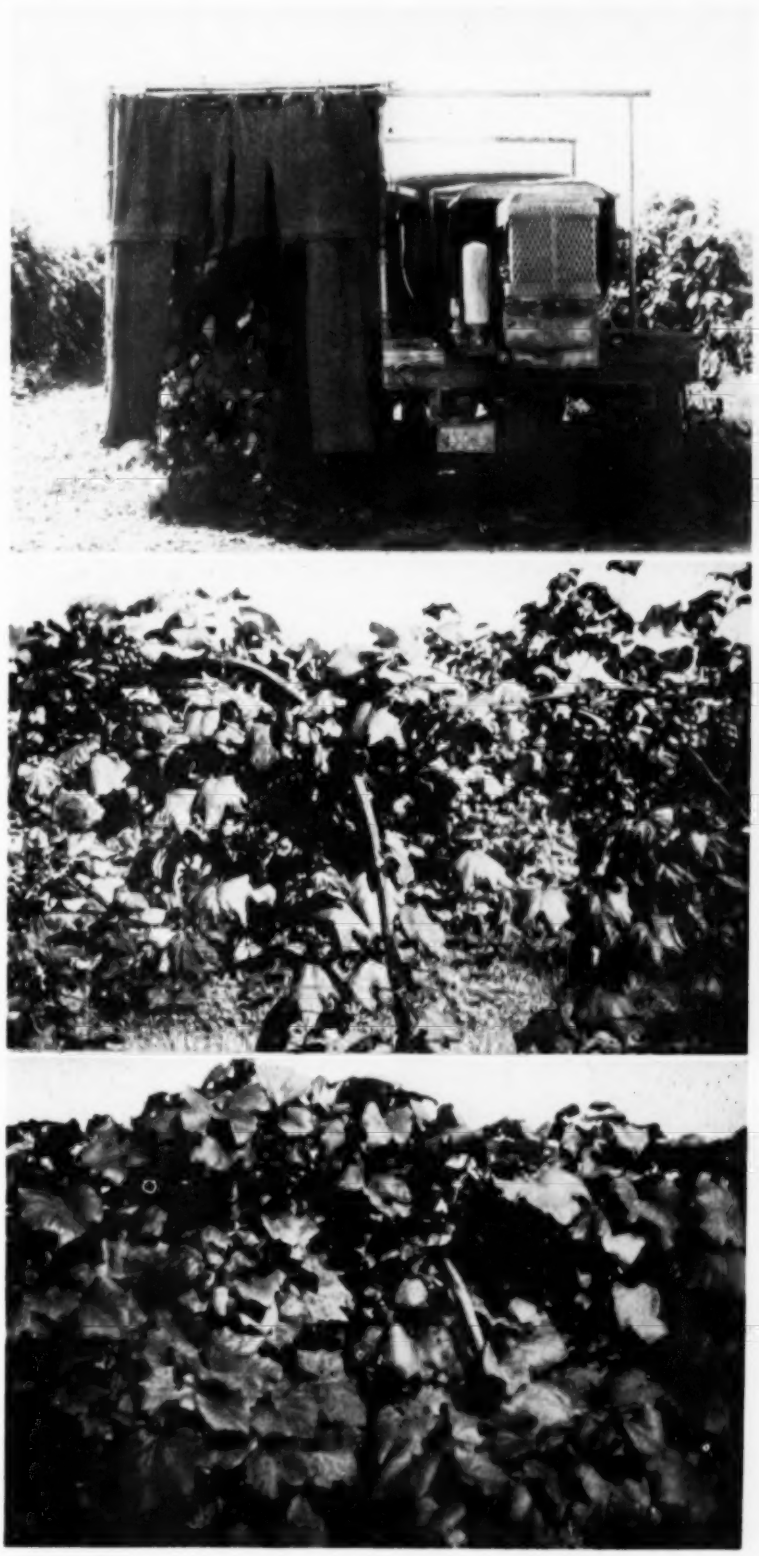
The sprays were applied with a hydraulic sprayer and a covered, inverted, U-shaped boom carrying 6 nozzles on each side of the row, and arranged so that the spray from the nozzles was directed upwards and into the foliage and clusters of the vine. The sprays were applied at the rate of 200 to 225 gallons per acre and at a pressure ranging from 450 to 500 pounds per square inch. A description of the spray schedule for the treatments is given in table 1.

The materials used in the experiments were as follows: DDT, a wettable powder containing 50 per cent DDT; copper sulphate, snow form of crystals; "Tribasic" copper sulphate, a neutral fixed copper containing 26 per cent metallic copper; lime, a high grade calcium hydrate; "Gulf Oil 501," viscosity 53 seconds Saybolt at 100° F., unsulfonated residue 93 per cent; "Sovaspray Oil No. 1," viscosity 58-60 seconds Saybolt at 100 °F., unsulfonated residue 92 per cent; "Triton B-1956," phthalic anhydride of glycerol alkyl resin; ferbam, ferric dimethyldithiocarbamate.

Results Noted

DURING the season of 1951 and 1952, an attempt was made to secure information on the following questions: Do sprays of bordeaux mixture, DDT and a combined spray

(*Turn to Page* 151)



In the Photos

Top picture:—Hydraulic sprayer and inverted U-Shaped boom for spraying grapes.

Center photo: Grape vine that received three applications of DDT and bordeaux mixture in 1952.

Lower: Grape vine that received three applications of DDT and ferbam in 1952. (All photo by the author)

Three-day New Orleans meeting hears latest on new products, markets, toxicology and new legislation at March convention of the

Natl. Agricultural

CHEMICAL means of reducing the 13-billion dollar loss suffered by American agriculture each year from insects, plant diseases and weeds, comprise the main topics of discussion at the annual Spring meeting of the National Agricultural Chemicals Association at New Orleans, La., March 11 through 13.

The meeting held at the Jung hotel, schedules talks by industry leaders and representatives of state and federal agencies, State Experiment Stations and the Federal Government.

Lea S. Hitchner, executive secretary of the NAC Association indicated late in February, that a near record attendance was expected. Scheduled to preside at various sessions of the convention are Arthur W. Mohr, president, California Spray Chemical Corporation, Richmond, Calif., president of the Association; and Paul Mayfield, Hercules Powder Co., Wilmington, Del., Association vice-president.

Other speakers expected to appear on the program include Avery S. Hoyt, chief, Bureau of Entomology and Plant Quarantine, U.S.D.A., Washington, D. C.; Dr. A. F. Camp, vice-director in charge of the Florida Agricultural Experiment Station; Dr. Warren C. Shaw, Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S.D.A., Washington, D.C.; and Senator Allen J. Ellender, Louisiana, member of the Senate Standing Committee on Agriculture and Forestry. Dr. Charles E. Palm, head, Department of Entomology, Cornell University, Ithaca, N.Y. and president of the new Entomological Society of America is to appear on the program as is Dr. Eugene Butler, vice-president and editor of the *Progressive Farmer*, Dallas Texas.

The meeting program, as issued by the Association in advance of the convention, follows:

TUESDAY, MARCH 10

Registration, 4 p.m. to 10 p.m.
Committee Meetings

WEDNESDAY, MARCH 11

10 a.m.

Meeting Called to Order
Paul Mayfield presiding. NAC vice-president and manager of Naval Stores Department, Hercules Powder Co., Wilmington, Del.

10:05 a.m.

President's Address
Arthur W. Mohr, NAC president, and president, California Spray-Chemical Corp., Richmond, Calif.

In the Photos:

Above: Lea S. Hitchner, NAC Association, Washington, D. C.

Middle photo: Paul Mayfield, Hercules Powder Co., vice-president, NAC Association, Wilmington, Del.

Below: Dr. A. F. Camp, vice-director in charge, Florida Agricultural Experiment Station, Lake Alfred, Florida.

Chemicals Assn.

10:25 a.m.
Executive Secretary's Report
Lea S. Hitchner, NAC Association, Washington, D. C.

10:45 a.m.
"Some Important Economic Pest Problems"
Avery S. Hoyt, chief Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington.

11:05 a.m.
"Minor Elements and Nutritional Sprays"
Dr. A. F. Camp, vice-director in charge of Florida Agricultural Experiment Station, Lake Alfred, Fla.

11:25 a.m.
"Transportation $$$$ and Sense"
E. C. McClintic, vice-president, traffic, Pure Carbonic Company, New York

11:45 a.m.
"Recent Advances in Weed Control"
Dr. Warren C. Shaw, agronomist, Division of Weed Investigations, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

12:05 p.m.
"Agricultural Chemicals and Southern Agriculture"
Hon. Allen J. Ellender, Member of the Standing Committee of Agriculture and Forestry, New Orleans, La.

6:00 p.m.
Reception for Members and Guests

THURSDAY, MARCH 12

Committee Meetings
Meeting of NAC Board of Directors
Golf Tournament

7:00 p.m.
Banquet for Members and Guests

FRIDAY, MARCH 13

10:00 a.m.
Meeting Called to Order
President Arthur W. Mohr, presiding

10:05 a.m.
"Pending Legislation"
Joseph A. Noone, Technical Adviser, NAC Association

10:25 a.m.
"Systemic Insecticides"
Dr. H. G. Johnston, head, Research and Development Unit, National Cotton Council, Memphis, Tenn.

10:45 a.m.
"NAC and the Formulator"
James T. Conner, Jr. entomologist, Taylor Chemical Co., Aberdeen, North Carolina.

11:05 a.m.
"Forest Insects"
R. Joseph Kowal, senior entomologist in charge, Forest Insect Investigation, Bureau of Entomology and Plant Quarantine, U.S.D.A., Gulfport, Miss.

11:20 a.m.
"Lumber Insects"
H. R. Johnston, entomologist, Bureau of Entomology and Plant Quarantine, Division of Forest Investigations, U.S.D.A.

11:35 a.m.
"The Future of Agricultural Chemicals in the South"
Dr. Eugene Butler, vice-president and editor, the *Progressive Farmer*.

11:55 a.m.
"Foreign Insecticide Developments"
Dr. Charles E. Palm, head of Department of Entomology, Cornell Univ., and president, Entomological Society of America

12:15 p.m.
"Liability and Safe Use"
John D. Conner, NAC Counsel.

In the Photos:

Top: Avery S. Hoyt, chief, Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture, Washington, D.C.

Middle: Dr. Charles C. Palm, president, Entomological Society of America.

Lower: Dr. H. G. Johnston, National Cotton Council, Memphis, Tenn.

A review of Considerations involved in the Development of

AGRICULTURAL CHEMICALS

by

Richard H. Wellman*

A Division of Union Carbide & Carbon Corp.
Carbide & Carbon Chemicals Co.
New York

THE development of agricultural chemicals has become, in the last 15 years, an increasingly complicated problem. This article is devoted to an explanation of the many steps and technical skills now necessary before such a product can be developed.

There is currently great emphasis on the development of agricultural chemicals because the damage due to weeds, insects, and fungi costs each of us, man woman or child, about $5.00 per month. This figure holds for continental United States according to the best available estimates, and would probably hold throughout the world where scientific agriculture is practiced. In many areas of the world, use of improved varieties and better cultural and fertilizer practices must be made before the benefits from insecticides, fungicides, and herbicides can be realized fully. There are other important reasons why there is a continually growing interest in agricultural chemicals. The fact that there are 50,000 more people in the world sitting down for breakfast each day is illustrative of the increasing population that agriculture will be called upon to feed. Therefore, in addition to achieving the maximum of productivity, it is necessary to avoid waste of any part of food production through weed competition, fungus or insect destruction.

Increased labor costs have made farmers conscious of the value of mechanization. In many instances, satisfactory chemical pest control is an integral part of such mechanization. Today, the man with the hoe is expensive and wherever possible he is being replaced by the use of chemical weed control.

The consumer has become more conscious of quality in his purchase of fruits and vegetables. The wormy apple and the blotched orange not only are no longer saleable, they are also illegal. In the case of apples, spray schedules are devised with the aim of achieving maximum insect and disease control with the least effect on gloss and color of fruit. Thus not only quality but also eye appeal for the consumer is important.

*Based on a paper presented before the Hawaiian Sugar Technologists at their annual meeting, Honolulu, November 17, 1952.

Field Expanding

THE tremendous growth of the organic chemicals industry in recent years has made available a vast number of completely new molecules. The author's own company has announced recently the successful operation of a plant that makes chemicals directly from coal, which is pulverized and hydrogenated under controlled temperatures and pressures. This relatively mild treatment of the condensed ring structures in coal is expected to bring into use many previously rare or unknown chemicals at costs economically attractive for agriculture. Other companies in other fields are similarly adding to the flood of new things which would be poten-

tially cheap if large enough markets were found.

It has been within only the last ten years that we have become aware of possibilities in pest control and only in this period have enough signposts been erected to give the incentive to explore further. The author remembers well his first search for organic fungicides, some thirteen years ago. The head of a department of plant pathology in a well known university wished the project good luck, then commented that there would never be an organic compound which would seriously compete with sulfur or copper and, consequently, this search should be regarded as valuable experience and plans should be made toward seeking some more feasible endeavor in a few years. It was not until the chlorinated hydrocarbon phosphorous insecticides (including the newer systemic insecticides), the dithiocarbamates, glyoxalidines and quinones as fungicides, and the herbicide 2,4-D, were developed, that research workers could visualize still other problems that seemed capable of solution. The big steps forward are in finding something beyond what can be predicted. Scientists are still far too timid in what they expect chemicals to be able to do in agriculture.

As recently as the early thirties, with a few notable exceptions, most of the search for new agricultural chemicals was done by isolated workers in experiment stations. In general, synthesis facilities were limited or non-existent so that experimentation was confined to such chemicals as were available from supply houses. If effective chemicals were found, there often remained the problem of interesting a chemical manufacturer in producing the material in quantity. The manufacturer knew little of the total available market or what the farmer could afford. In such a system there was no patent protection to aid the manufacturer in recovering his expenses attendant to developing large scale production processes.

Today, integrated teams are formed for the purpose of developing

Attitude toward research has changed during past decade, Dr. Wellman says. Research teams include large group with diverse skills, each working out particular phase of mutual problem

agricultural chemicals. Workers in chemical companies have close liaison with those in state and federal experiment stations and with grower organizations, food processors and, in some instances, with large growers themselves. Members of a chemical company's portion of such a team would include organic, physical and analytical chemists, biologists, toxicologists, patent attorneys, market survey specialists, and the large group of people of diverse training that are concerned with production and marketing. These people have individual responsibilities but their activites are so interrelated and correlated that the product of their activities must be considered as a group function.

Some of their duties are: (1) Synthesizing interesting new chemicals; (2) Finding which member of a given series of compounds is the most effective; (3) Comparing the activity of the new chemical with existing standard materials; (4) Investigating the economics of production; (5) Making market surveys to determine the potential volume of sales; (6) Obtaining patent protection: (7) Determining the hazards of the new compound to warm-blooded animals; (8) Working out analytical procedures and making analyses of the residue left on the crop; (9) Finding how to make a useable formulation; (10) Investigating the effect on the crop that is being protected; and (11) Providing first experimental, and then, commercial quantities of the product.

Concurrently, workers in State and Federal Experiment Stations as well as the research departments of grower and processor organizations are examining the possible usefulness of these new materials for their own specific problems. Such studies will involve adaptation of many kinds: formulation may have to be changed; timing of application must be studied; duration of effectiveness must be determined; comparisons should be made under field conditions with the best materials currently available; investigations of the new material's compatibility with other pesticides which ordinarily would be used in conjunction with it are necessary. This is a kinetic team in which there is a constant exchange of ideas between the various members of the team. Each is doing what his training, experience, and facilities allow him to do best, yet each individual's work is influenced by the results obtained by his teammates.

Teamwork is the Key

TEAMWORK of the type just described is largely responsible for the sale of $90,000,000 worth of agricultural chemicals that were not out of the development stage 10 years ago. One rule of thumb is that the grower gets back $1.00 for each dime he puts in to agricultural chemicals. Thus the combination of savings and additional production due to these new chemicals, amounts to nearly one *billion* dollars to the farmer. It is an expensive undertaking, probably costing $5,000,000 a year in the United States and can be justified only as long as it continues to get results. This system has been criticized on the basis of duplication of effort by different companies working with the same group of chemicals and it has been suggested that a well-integrated, well-planned program would be much more efficient. Efficiency is not best attained by a massive over-all approach to a problem, because no single mind is capable of organizing and directing such a complex endeavor. Rather, it is handled best by closely-knit groups spearheading an

attack on a specific problem in their own particular area of proficiency. This is a description of the way development is now being done.

Knowledge of how to develop an agricultural chemical is neither an exact science nor a matter of luck. It is probably somewhere between an art and an inexact science, with a lot of luck necessary for success. The first ideas for development come from many different sources, varying from a chemical company wanting to find a use for a specific chemical, to a farmer needing desperately a chemical solution to one of his problems. Frequently those in management decide that the company would like to enter the agricultural chemical field. They assemble a research group to organize such a project. This group learns what has already been done in the field and what chemical potentials their company has. They make and test some compounds. Out of experience and luck come the good ones.

Often a group will have in mind a specific requirement they would like a chemical to meet. For example they might want to weed sugar cane without injury to adjacent pineapple. Nonetheless a successful group must be opportunistic and find where the properties of its chemicals can be used to advantage. It is impossible to lay out a research program with specific purposes in mind and have any assurance of reaching those goals. Probably chemicals will be discovered which have useful places different from the proposed objectives. Thus, in searching for a herbicide, it is necessary to have some initial tests designed to show whether the compounds under consideration have any of the general properties necessary for a successful herbicide. That is, are they effective in killing weeds or weed seedlings through contact, physiological or residual toxicity.

How Search Begins

AS an example of how such a research is started in the field of herbicides, the following initial tests are used at the Boyce Thompson Institute of Plant Research:

1. A contact spray is applied to beans, corn, and tomatoes. These three plants grow well in the greenhouse and represent widely different families of plants. This test gives information on hormonal and caustic materials and also gives some idea on selectivity.

2. The soil in which potted tomato plants are growing is watered with solutions of the chemical. This test shows whether a chemical is toxic to the root system, whether it is systemically toxic, and, whether it has hormonal action.

3. Seeds are germinated in the presence of the chemical. This is done both in petri dishes on blotter paper and in soil in pots. The results of the two tests may differ. In general, chemicals are more effective in the absence of soil than they are in its presence.

It will be noted that all these are directed exclusively at finding chemicals that through one or another route, are highly toxic to plants. Very little is done about selectivity. The philosophy behind this is very much like the formula for rabbit stew which starts with: "First catch your rabbit." Here the first thing necessary is to have a compound that will kill weeds.

The development of sodium 2,4 - dichlorophenoxyethylsulfate, ("Crag Herbicide 1,") serves as a concrete example of how an agricultural chemical comes into being. Several years ago our chemists synthesized 2,4-dichlorophenoxyethanol. This was after 2,4-D and it seemed quite logical to assume that the alcohol might have similar properties and might be more or less effective than the acid. It was sent to the Boyce Thompson Institute Fellowship for screening and was found to be less effective than 2,4-D when applied to the tops of plants and somewhere near the same effectiveness when applied to the soil and taken up through the roots. It was also a germinative toxicant (killed seedlings) in either petri dish or soil tests.

These results suggested the synthesis of an ester which should penetrate foliage more readily. The acetate of 2,4-D dichlorophenoxyethanol was prepared and tested. It was somewhat more readily adsorbed but was not as effective as 2,4-D. It then occurred to the chemists that an ester of an inorganic acid might be of interest. Thus, sodium 2,4-dichlorophenoxyethylsulfate was made and examined. It was inactive in the foliage test, inactive in the seed germination test in petri dishes and only mildly active in the tomato watering test, but very active in the seed germination test in the presence of soil.

This peculiar behavior is the element of unpredictability and luck mentioned earlier. It was not until 1952 that Dr. Vlitos isolated from the soil and identified an organism, *Bacillus cereus* var. *mycoides* which by virtue of production of a sulfatase converts sodium 2,4-dichlorophenoxyethysulfate to the active herbicide. The first step in the conversion is the alcohol and some acid is formed later. No conclusive evidence exists yet as to whether it is the alcohol or the acid which plays the major role in herbicidal action. It often takes years to explain the mechanism of action of a chemical once its effectiveness is known.

Though only three compounds were mentioned in the search for sodium 2,4-dichlorophenoxyethylsulfate, actually this compound was number 5264 of the ones examined, and this material was designated as "Crag Herbicide 1." Thus one commercial herbicide was found out of 5264 compounds tested!

After a compound has been found active for a given purpose, related members may be synthesized. Active phytotoxic groups, such as NO_2 may be incorporated in the molecule. Solubility may be changed by making a salt or by sulfonating it. Considerable skill is required in achieving the peak in performance once an effective compound is known.

To a more limited extent, there exists a knowledge of which chemical groups to explore. This latter is fraught with danger: for example, it would be predicted that an effective insecticide could not be made from carbon, hydrogen, and oxygen solely; yet these are the only constituents of pyrethrins and allethrin. Allethrin was developed by a different route than that outlined above. That is, members of a research team of the United States Department of Agriculture first elucidated

(*Turn to Page* 139)

Maleic hydrazide, grass growth inhibitor, being applied to roadside at rate of 4 pounds in 80 gallons of water, per acre. Truck is mounted with single nozzle fan sprayer.

Temporary Grass Inhibition with

Maleic Hydrazide

by

John W. Zukel

Naugatuck Chemical Division
U. S. Rubber Co.
Bethany, Connecticut

FOLLOWING discovery in 1948, of the plant growth inhibiting properties of maleic hydrazide, suitable uses for the material have been sought both in agricultural and semi-agricultural fields. Since the degree of inhibition produced by maleic hydrazide is proportional to the dosage applied, experiments were undertaken in cooperation with the Connecticut State Highway Department to see if use of MH on roadside grasses might reduce the number of times such areas must be mowed each season. Such a test program began in 1950, and since that time some 300 acres of plots have been evaluated using various types of equipment, dosages, times of treatment and retreatment. Continued experiments have led to the conclusion that frequency of mowing can be reduced substantially through a program of MH application.

Results of these tests have brought information regarding the best types of equipment for this work; the pressure to be used for optimum results; the most effective dosages and the best timing of application. The most satisfactory equipment for application of MH on highway areas, was found to be a hydraulic sprayer operated at 200 pounds pressure delivering 40 gallons of solution per acre through a nozzle[1] giving a fan spray ten feet wide. Use of low pressure, low volume equipment delivering 40 gallons of liquid per acre through a boom equipped with ten nozzles, was found satisfactory likewise.

As to timing, results of experiments during the past three years indicate that the best times of treatment to secure the maximum degree

1 Off center spray nozzle, Spraying Systems Company, Bellwood, Illinois

of inhibition at minimum dosages were either a spray applied to green grass (when about 3 inches tall) at the start of growth in April or May depending on the season, or a fall spray made to green grass before dormancy, or in October (Under Connecticut conditions.)

Summer sprays likewise inhibit grass, but the length of inhibition is less during this period than from equivalent dosages applied either during the spring or the fall.

MH is absorbed by green grass over a period of about 24 hours and then translocated downward for about one week to ten days. Any rain occurring within the 24 hour period after spraying may reduce the effectiveness of the chemical in proportion to the amount of precipitation, but once MH is absorbed by the plant there is no loss from rainfall.

Spraying of grass before mowing during the summer is preferred in order to allow a larger absorption surface, and one week should be allowed for downward translocation before the area is mowed.

Use of 40 or more gallons of liquid per acre is required to distribute the MH uniformly. Lower volumes per acre were less effective but quantities of 200 gallons per acre gave satisfactory results.

No Drift Problem

TESTS in Connecticut have indicated that use of maleic hydrazide carries no problems of drift, nor of sprayer contamination. The sprayer can be flushed free of the chemical easily. The material, moreover, has low mammalian toxicity, the sodium salt of MH showing an oral LD 50 of 6.95 grams per kilogram, for rats. Extensive toxological studies now in progress show no apparent adverse effect on animals consuming 5% MH as sodium salt incorporated in their daily diet in chronic feeding studies. These studies have been continued for a year and three months. Dairy cows feeding upon maleic hydrazide-treated grass, were able to eliminate the chemical with none of it appearing in the milk.

Having completed experiments in the fall of 1951 and the spring and summer of 1952, the following results have been computed from this work.

Fall application of October, 1951. A 20-acre plot of median sprayed at four pounds MH (10 pounds MH-40) per acre on October

In the Photos

Top picture: Grass at right next to guard rail, was treated with maleic hydrazide to retard growth. It has not been mowed at all. Taller grass at the left has been mowed four times. (Scene is along Merritt Parkway in Connecticut)

Lower picture: This grass was sprayed in May and photographed two months later. No mowing has been necessary.

15, 1951, showed an even and delayed growth in the spring of 1952 with no adverse effect on appearance of the grass. Ten acres were inadvertently mowed by maintenance crews, but the balance, retreated at 4 pounds MH (10 pounds MH-40) required one mowing during the season whereas adjacent check was mowed 17 times in normal maintenance practices. The basic grasses were Chewings New Zealand Fescue, Redtop and Kentucky Blue grass. (Figure 2).

Spring Application, 1952. Plots treated at 4 pounds MH (10 pounds MH-40) per acre in early May inhibited growth for 6 weeks and then mowing was required; whereas 6 pounds MH (15 pounds MH-40) noticeably inhibited growth for 3 months before mowing was required. Roadside areas treated at 6 pounds (15 pounds MH-40) per acre in May, inhibited grass throughout the season.

Summer application, 1952. Summer application of 4 pounds MH (10 pounds MH-40) per acre inhibited grass for about 6 weeks and a 6 pound (15 pounds MH-40) per acre MH level inhibited the grass for the remainder of the season.

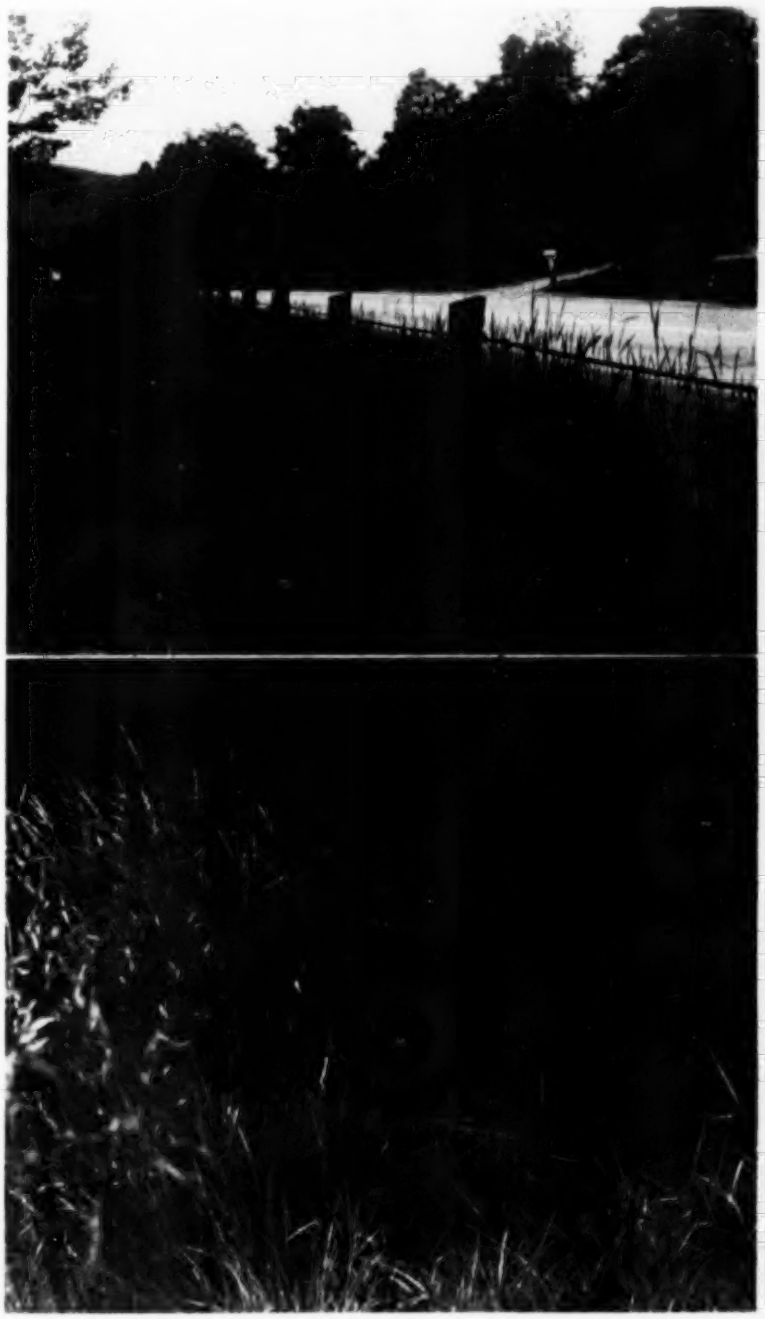
The effect of retreatments made at various intervals indicates that a cumulative effect is obtained if MH is applied to a plot which has not shown regrowth. Retreatment of areas which resumed normal growth exhibited the degree of inhibition expected of an application to a new area.

No herbicidal effects were noted in any of the plots nor has there been any noticeable reduction in stand of grass. Excessive dosages will produce a temporary browning of the grass. Some varieties of clover show a temporary purple anthocyanin coloration.

Root weight sampled from various plots showed no significant difference over checks. MH residue analyses of roots indicate that none or negligible quantities were present in roots the following season, unless the chemical is applied just prior t dormancy. There was no residual toxicity of MH in the soil and this confirms a recent detailed study by Levi and Crafts (1952) who found that MH either leached or decomposed in the soil.

To summarize the results of experiments with maleic hydrazide, it should be recalled that application

(*Turn to Page* 143)



In the Photos

Above: Grass along highway has been left untreated. Note some weeds taller than guard rail posts.

Lower photo: Grass at the right had been sprayed the previous fall (October) and in May before picture was taken in July. Note marked contrast between height of this grass with untreated check to the left.

U.S. Uses 22 Million Tons of Fertilizer, 1952

Table 1. - Preliminary Consumption of Fertilizers in the United States Year Ended June 30, 1952 1/

State & Region	Consumption				
	Commercial Fertilizers Guaranteed to Contain N, P_2O_5, or K_2O			Minor and Secondary Element Materials 3/	Grand Total All Fertilizers and Minor and Secondary Element Materials
	Mixtures	Materials 2/	Total		
	Tons	Tons	Tons	Tons	Tons
Maine	201,488	14,376	215,864	71	215,935
New Hampshire	15,148	5,795	20,941	81	21,022
Vermont	58,880	17,380	86,080	36	86,085
Massachusetts	74,248	17,746	91,994	85	92,079
Rhode Island 4/	13,800	3,400	16,800	10	16,810
Connecticut	80,548	27,795	86,143	891	87,234
New England 4/	401,262	86,490	486,742	1,173	487,915
New York	488,612	147,718	634,328	589	634,917
New Jersey	241,011	23,884	264,865	117	264,982
Pennsylvania	567,816	96,067	663,883	972	664,856
Delaware	74,109	6,171	80,280	107	80,387
District of Columbia	1,731	810	2,541	0	2,541
Maryland 4/	268,000	26,700	289,700	300	290,000
West Virginia	73,156	26,738	99,873	5	99,878
Middle Atlantic 4/	1,707,414	328,083	2,035,497	2,091	2,037,588
Virginia	739,727	120,385	860,110	8,801	868,911
North Carolina	1,671,194	243,022	1,914,216	27,716	1,941,932
South Carolina	718,201	258,238	976,439	2,662	979,101
Georgia	1,079,363	236,853	1,316,216	16,114	1,332,330
Florida	873,886	93,465	1,067,050	21,649	1,088,699
South Atlantic	6,082,180	1,052,961	6,136,111	76,762	6,210,873
Ohio	983,441	66,020	1,049,461	86	1,049,547
Indiana	934,176	148,440	1,082,616	47	1,082,661
Illinois	692,307	842,094	1,434,301	47	1,434,348
Michigan	836,880	53,949	890,809	412	890,921
Wisconsin	360,886	42,696	393,583	210	393,765
East North Central	3,307,240	1,153,198	4,860,438	802	4,861,240
Minnesota	171,202	52,352	223,554	1,522	225,106
Iowa	277,848	149,076	426,924	4	426,928
Missouri	627,880	526,249	783,079	16	783,095
North Dakota	31,476	9,673	31,148	0	31,148
South Dakota	8,633	8,661	11,294	0	11,294
Nebraska	51,860	60,591	92,451	0	92,451
Kansas	84,889	123,104	207,990	0	207,990
West North Central	1,080,414	726,736	1,746,150	1,542	1,747,692
Kentucky	492,962	147,149	630,101	18	630,119
Tennessee	445,327	159,337	602,564	196	602,760
Alabama	934,944	486,401	1,321,048	484	1,321,529
Mississippi	370,333	454,694	825,527	1	825,528
East South Central	2,161,856	1,227,581	3,379,437	699	3,380,136
Arkansas	188,048	149,987	338,058	1	338,064
Louisiana	179,374	146,298	325,672	8	325,678
Oklahoma	66,018	107,637	172,655	0	172,655
Texas	293,481	313,961	607,442	7,922	615,364
West South Central	725,941	737,883	1,443,824	7,929	1,471,753
Montana	3,279	19,502	22,781	462	23,243
Idaho	11,837	55,789	67,196	4,848	71,044
Wyoming	671	6,010	6,681	75	6,756
Colorado 4/	14,000	30,000	44,000	800	44,800
New Mexico	1,520	17,560	19,080	0	19,080
Arizona 4/	24,600	79,000	102,600	15,000	117,600
Utah	2,879	27,624	30,108	450	30,638
Nevada 4/	350	1,550	1,900	500	2,400
Mountain 4/	58,436	236,005	294,441	21,618	316,956
Washington	29,722	61,939	89,661	2,987	91,648
Oregon	30,290	86,677	106,978	13,338	120,306
California	214,353	747,783	962,136	664,988	1,627,101
Pacific	281,375	896,399	1,167,772	681,288	1,839,057
Continental United States 1951-52 4/	14,806,076	6,444,306	21,250,382	791,800	22,042,182
1950-51	13,660,406	6,222,164	19,882,570	645,350	20,507,920
1949-50	12,058,048	5,902,207	17,838,250	439,382	17,977,632
Hawaii	88,635	80,042	118,677	104	118,681
Puerto Rico	232,195	41,784	265,977	0	265,977
Alaska	117	446	563	0	563
Territories	277,946	102,272	380,117	104	380,221
United States Including Territories 1951-52 4/	15,083,921	6,546,578	21,630,499	791,904	22,422,403
1950-51	13,977,350	6,365,449	20,343,299	645,441	20,988,740
1949-50	12,297,995	6,006,197	17,908,793	439,807	18,343,300

1/ Includes fertilizers distributed by Government agencies.

2/ Includes: Ground phosphate rock, basic slag, dried or processed manures but not unmanipulated manures, sewage sludges, and all other materials guaranteed to contain N, P_2O_5, or K_2O supplied for direct use in agriculture. Excludes the quantity of materials consumed in the manufacture of commercial mixtures.

3/ Includes only those materials supplied by manufacturers of commercial fertilizers, such as borax, sulfur, gypsum, metallic salts, not guaranteed to contain N, P_2O_5 or K_2O. Does not include liming materials, or the quantity of minor and secondary element materials supplied through sources other than manufacturers of commercial fertilizers.

4/ Estimated

Preliminary report by U.S.D.A. estimates increase of 6.8 % over last year's consumption

THE quantity of commercial fertilizer consumed in the United States during the year ended June 30, 1952, estimated from data presently available, is 22.4 million tons. This is an increase of 1.4 million tons of fertilizer or 6.8 percent more than the consumption of 20,988,740 tons reported in 1950-51[1]. Commercial mixtures, 15.1 million tons, constituted 67.3 percent of this total. The other 32.7 percent was composed of 6.5 million tons of materials guaranteed to contain N, P_2O_5, or K_2O, and 0.8 million tons of materials not guaranteed to contain N, P_2O_5, or K_2O, mainly gypsum. Consumption of fertilizer, by States, regions, and classes, is given in Table 1. The totals for most of the States are considered complete. The totals for those States indicated as "estimates" may possibly be changed in a later report. The preliminary total for the United States is probably within 75 thousand tons of the final total.

10 Year Pattern

DISTRIBUTION of fertilizer, by regions, over the ten-year period (1942-43 to 1951-52) is given in Table 2. The use of fertilizer in 1951-52 is 11 million tons (96 percent) greater than in 1942-43. The increase in use of fertilizer during this ten-year period is greatest in the East North Central region with 2.9 million tons. In the South Atlantic region, it was 1.8 million tons; and 1.4 million

1 Agricultural Chemicals "Consumption of Commercial Fertilizers in the U. S., 1950-51" Vol. 7, No. 6, pp. 33-40 (1952); Commercial Fertilizer: Vol. 84, No. 6, pp. 20-21, 24-25, 28-29, 34, 36, 40-41 (1952); Farm Chemicals: Vol. 115, No. 7, pp. 13, 15, 17, 19-21, 23-25, 27 (1952).

by

Walter Scholl and Hilda M. Wallace

Division of Fertilizer & Agricultural Lime
Bureau of Plant Industry, Soils, and Agricultural Engineering
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Beltsville, Maryland

tons in each of the following regions: East South Central, West North Central, and Pacific. The quantity of fertilizer consumed annually in New England has changed little during this ten-year period. The trend in quantity of fertilizer consumed, by regions, is shown in Figure 1.

The relative change in the quantity of fertilizer consumed annually is also shown in Table 2. The increase in consumption for regions along the Atlantic coast has occurred with lesser variations in rates of increases or decreases than for most all other regions. Their weighted average rate of change has ranged between 7.8 percent and minus 2.3 percent.

(*Turn to Page 129*)

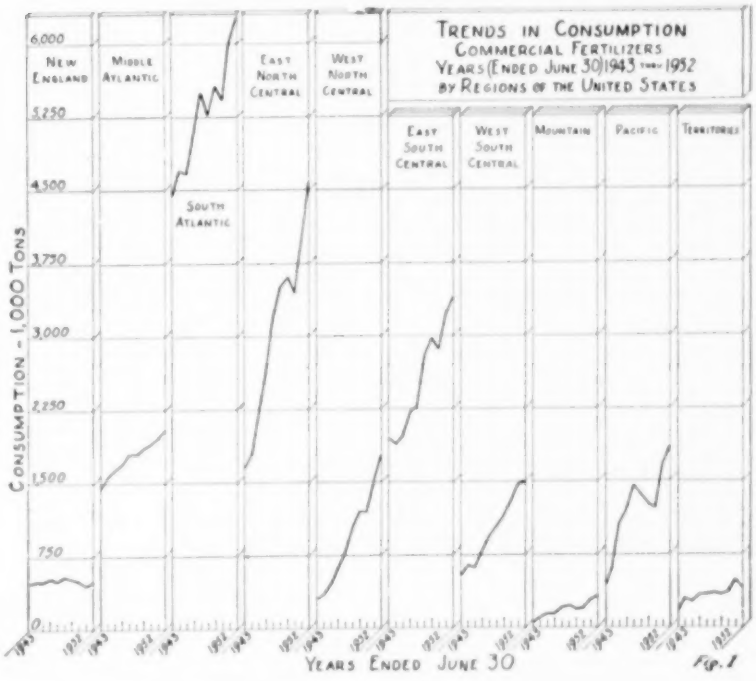


Table 2. - Distribution of Fertilizers for Years 1943 through 1952 and Percent of Change, By Regions. 1/

Regions	Years Ended June 30									
	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
New England										
Consumption-tons	490,411	492,636	493,262	521,288	505,814	536,150	521,255	505,598	456,567	487,913 3/
Percent of Change		0.45	0.13	5.68	-2.97 2/	5.80	-2.80	-3.04	-9.84	6.84
Middle Atlantic										
Consumption-tons	1,454,738	1,547,672	1,622,279	1,680,917	1,776,909	1,796,636	1,856,029	1,893,721	1,956,283	2,037,862 3/
Percent of Change		6.40	4.81	3.61	5.71	1.11	3.31	2.03	3.30	4.15
South Atlantic										
Consumption-tons	4,434,917	4,678,417	4,652,639	5,014,148	5,473,540	5,245,287	5,536,475	5,409,171	6,004,426	6,210,873
Percent of Change		5.49	-0.55	7.77	9.16	-4.17	5.55	-2.30	11.00	3.44
East North Central										
Consumption-tons	1,643,853	1,782,407	2,176,288	2,615,956	3,159,384	3,500,319	3,594,685	3,434,174	3,979,359	4,581,240
Percent of Change		8.43	22.10	20.20	20.77	10.79	2.70	-4.47	15.88	14.37
West North Central										
Consumption-tons	309,814	356,931	462,266	635,630	770,257	1,027,931	1,190,650	1,186,416	1,500,798	1,747,692
Percent of Change		15.21	29.51	37.50	21.18	33.45	15.82	-0.35	26.50	16.45
East South Central										
Consumption-tons	1,932,091	1,880,178	1,968,975	2,213,183	2,265,447	2,776,680	2,941,614	2,840,808	3,206,314	3,380,136
Percent of Change		-2.69	4.72	12.40	2.36	22.52	5.98	-3.43	12.87	5.42
West South Central										
Consumption-tons	546,606	631,423	619,810	789,047	935,366	1,032,880	1,148,466	1,288,031	1,463,958	1,471,753
Percent of Change		15.52	-1.84	27.30	18.54	10.42	11.19	12.15	13.65	0.54
Mountain										
Consumption-tons	48,384	95,371	135,830	143,510	196,527	221,998	183,761	208,369	280,978	315,986 3/
Percent of Change		97.11	42.42	5.65	36.94	12.96	-17.22	11.76	34.77	12.49
Pacific										
Consumption-tons	445,131	605,575	1,070,106	1,190,275	1,423,464	1,334,333	1,227,852	1,214,644	1,659,337	1,839,067
Percent of Change		36.04	76.71	11.23	19.59	-6.26	-7.98	-1.08	36.62	10.83
Continental U. S.										
Consumption-tons	11,305,945	12,070,806	13,201,454	14,803,954	16,506,877	17,470,214	18,200,887	17,977,632	20,507,930	22,042,182 3/
Percent of Change		6.76	9.37	12.14	11.50	5.84	4.18	-1.22	14.07	7.48
Territories										
Consumption-tons	159,383	286,464	264,700	323,725	331,975	348,187	340,998	365,668	480,820	380,221
Percent of Change		80.99	-8.24	22.30	2.55	4.88	-2.06	7.23	31.49	-20.92
United States and Territories										
Consumption-tons	11,465,328	12,359,270	13,466,154	15,127,679	16,838,852	17,818,401	18,541,885	18,343,300	20,988,740	22,422,403 3/
Percent of Change		7.80	8.96	12.34	11.31	5.82	4.06	-1.07	14.42	6.83

1/ Includes: Ground phosphate rock, basic slag, dried or processed manures but not unmanipulated manures, sewage sludges, minor and secondary element materials, and fertilizers distributed by Government agencies. Excludes materials used in the manufacture of commercial mixtures and liming materials but includes gypsum distributed by manufacturers of fertilizers.
2/ Minus sign denotes a decrease.
3/ Preliminary.

Taste Panel Studies on Fungicides

SINCE at the present time there is neither machine nor analytical tool to judge the quality of a food material, the laboratory technician is attempting to adapt the human senses and use them as an analytical tool.

Food evaluation panels are used either to predict consumer preference or to detect differences in like foods. Consumer preference panels should be sufficiently large to reflect the variables of race, nationality, age and geographical differences in like foods, for example, when one wishes to determine the effect on the flavor of a food material of a new pesticide.

Flavor is that quality which affects three distinct senses—taste, feeling, and smell—in the oral cavity and the passages from the mouth to the nostrils. Taste is perceived by the taste buds of the tongue and possible buds in the cheeks. It is generally believed that there are only four tastes—bitter, salt, sour, and sweet. The sense of feeling is affected by texture, astringency, metalicness, coolness, and warmth. Smell is perceived in the back part of the mouth and in the nasal passages; and Dr. A. D. Crocker of the Arthur D. Little Laboratories in Cambridge, Massachusetts has described odor sensations as fragrant, exemplified by the sweetness of flowers, spices, honey, etc.; acid, exemplified by the sharpness of vinegar and cheese; burned, exemplified by the odor of burning flesh; and caprylic, exemplified by the odor of a wet dog. The combination of taste, feeling, and odor sensations results in what we call flavor.

It is generally agreed that a flavor evaluation panel is more effective if the panel members are required only to discriminate between samples and not to make judgments such as are required in ranking tests where samples are evaluated by numbers that have a corresponding description, going through the ratings of +5 gross excess, +4 very decided excess, +3 decided excess, +2 moderate excess, 0 ideal, —1 very slight deficiency etc. Discrimination tests require the judge to differentiate only between samples.

The Food Technology Department at Rutgers University uses only the discrimination tests in its work on assaying the influence of pesticides on the flavor of various food materials.

When the influence of a specific agent on the flavor of a food material is being investigated and when a sufficient number of samples are available for the training of the

The use of pesticides is absolutely necessary in production of fruits and vegetables of high quality; free from blemishes caused by insect attack or plant diseases.

Yet, the question arises, does the application of different pesticides affect the flavor of foods?

Studies of taste panels help to guide the trade in determining kinds of materials to use, and the best concentration of each. (USDA Photo)

Taste judges discriminate between samples to simplify process of evaluation. Valuable information obtained through panel methods to determine whether presence of residues makes any difference in flavor of foodstuffs

by

Walter A. Maclinn

Chairman, Department of Food Technology
Rutgers University
New Brunswick, New Jersey

taste panel, the following procedure is used in the flavor evaluation work.

Preliminary Training

TO become familiar with the flavor of the specific agent involved, the judge tastes samples of food which are identified as having been exposed to the agent in the manner normally recommended for the use of that agent, but in a heavy concentration. A check sample, which has been produced under conditions comparable to the test items, but not exposed to the specific agent, is used as a basis of comparison.

The judge tastes each sample slowly in the following way: The sample is thoroughly masticated and

expectorated without swallowing. The mouth is rinsed with water and a refresher such as an apple or cracker is chewed and expectorated. The mouth is rerinsed with water and the judge then proceeds to the next sample. When the judge feels that he is thoroughly familiar with the particular flavor involved, he is served the samples coded in a triangle test in which two of the samples are alike and one is different.

The judge then tastes the samples and scores each of them by indicating whether the identifying flavor is:

a. Detectable
b. Not detectable
c. Cannot decide

After having evaluated and scored the three samples, the judge is requested to answer two questions:

a. Can you detect any difference between these samples?
b. If so, which samples are identical?

A total of three triangle tests are made, each on a different day. At each judging session the samples are rerandomized.

Test Sample Evaluation

AFTER completion of the triangle tests, the judges are selected on the basis of their ability to detect the particular flavor difference involved and their ability to pair identical samples. Then all test samples which have been exposed in various concentrations to the specific agent under investigation are tasted under a certain set of rules:

No more than six coded samples are evaluated at one testing period, one of which is a coded untreated sample; The samples are served to the judges three at a time on a divided plate. The judge then tastes each sample slowly, masticating the sample thoroughly and expectorating it without swallowing. The judge then scores the samples by indicating in the appropriate block whether the identifying flavor is:

(1) detectable
(2) not detectable
(3) cannot decide

The mouth is then rinsed with water, the refresher is chewed and expectorated, the mouth is rerinsed with water and the judge then proceeds to the next sample.

Replicate tastings are made on each series of test samples on three different days. At each judging session the samples are rerandomized.

Data Are Analyzed

THE data are analysed statistically in the following manner:

Arbitrary values of 5, 3, and 1 are assigned to the respective factors of "detectable," "not detectable," and "cannot decide." Average scores of the individual panel members on three replicate tastings are calculated, the mean of the average scores of the individual panel members is the panel score for each sample, and the panel scores are then analyzed by an analysis of variance to determine whether a difference exists between the samples.

The reproducibility of the judges and of the panel is also determined. A judge's reproducibility is calculated from the number of times a judge is able to reproduce his findings on three replicate tastings of a series of samples and is expressed as a percentage. Panel reproducibility is calculated from the number of times the panel is able to reproduce its findings on three replicate tastings of a series of samples and is expressed as a percentage.

Alternate Testing Method

WHEN an insufficient number of samples are available for preliminary training of the panel on any specific agent or on a specific food, the following procedure is used in the flavor evaluation work:

The samples which have been exposed to any of the different agents, in the manner normally recommended for the use of that material, are served to the judges, coded. A check sample is served to the judges, uncoded, at the same time. The check sample is one that has been produced under conditions comparable to the test items, but has not been exposed to the specific agent or agents being investigated. This sample is used as a basis of comparison during flavor evaluation of the other samples.

The judge then tastes the samples slowly by thoroughly masticating and expectorating them without swallowing. The judge scores the sample by placing a check in the appropriate block as to whether the flavor of the sample is:

(1) different from the check
(2) identical to the check
(3) cannot decide

The mouth is then rinsed with water, the refresher is chewed and expectorated, the mouth is rerinsed, and the judge then proceeds to the next sample.

The judge may refer to the uncoded sample as often as necessary during his evaluation of the coded samples, and replicate tastings are made on each series of samples on two different days. At each judging session the samples are rerandomized.

Data are then analyzed statistically, giving values of 5, 3, and 1 to the respective factors of "different from the check," "identical to the check," and "cannot decide."

The average scores of the individual panel members on two replicate tastings are calculated, the mean of the average scores of the individual panel members is the panel score for each sample, and the panel scores are then analyzed by an analysis of variance to determine whether a difference exists between the samples.

The reproducibility of the judges and of the panel is also determined. A judge's reproducibility is calculated from the number of times a judge is able to reproduce his findings on two replicate tastings of a series of samples and is expressed as a percentage. Panel reproducibility is calculated from the number of times the panel is able to reproduce its findings on two replicate tastings of a series of samples and is expressed as a percentage.

Either of these two testing procedures result in rather precise results because they require only *discrimination* by the panel member, rather than judgment. If a panel

(*Turn to Page* 145)

Third Annual Meeting

La. Insect Control Conference

---is held in Shreveport

THE third annual Louisiana Insect Control Conference was held in the City Hall Auditorium, Shreveport, Louisiana on January 15 and 16, with 150 members of Agricultural Research, Extension and Industry in attendance. Kirby L. Cockerham, entomologist, Louisiana Agricultural Extension Service, served as general chairman of the conference; Truman Thomas of the Anti-Pest Company, Shreveport, served as chairman for reservations and local arrangements, and Roger Wilbanks of Wilbanks Farm Implement Company, Bossier City, a local committeeman, assisted with general plans and the program for the conference.

The objective of this meeting was the promotion of a better understanding and closer cooperation between research, extension and industry in formulating and carrying out insect control in Louisiana.

J. Hallam Boyd, of the Commercial Chemical Company, served as leader of a panel discussion on the insecticide supply situation and orderly marketing. Other members of the panel included P. J. Reno, Hercules Powder Company; I. J. Becnel, Freeport Sulphur Company; J. F. White, Shell Chemical Company and Horace W. Lee, Niagara Chemical Division of Food Machinery Corporation. It was pointed out that there are ample supplies of insecticides and materials on hand at present but that a shortage could develop in mid-season if the marketing of insecticides is not done in an orderly manner. More concern was expressed over the orderly distribution and marketing than there was over the availability of materials. Mr. Becnel reported that his company had increased production of sulphur considerably; that all indications pointed to a plentiful supply for both domestic and foreign uses. Cryolite, which was in short supply in 1952, was reported to be plentiful this year.

A. L. Dugas, of the Louisiana Agricultural Experiment Station, discussed sugar cane insects in the state and explained methods of checking sugar cane fields for borer infestations, data on overwintering borers and chemical control. He pointed out that 50% ryania had been found generally more effective against borers than

In the Photos:

Top photo, L. to R.: Roger Wilbanks, Wilbanks Farm Equipment Co.; Kirby L. Cockerham, Louisiana Agricultural Extension Service, general chairman of the meeting, and Truman Thomas, Anti-Pest Co., chairman of local arrangements.

Second photo: (L to R): C. E. Smith, entomologist, Louisiana Agricultural Experiment Station; J. Hallam Boyd, Commercial Chemical Co. and National Agricultural Chemicals Association committeeman; and Charles Lincoln, entomologist, Arkansas Agricultural Experiment Station.

the 40% material. W. C. Pierce of the U. S. Bureau of Entomology and Plant Quarantine, Shreveport, Louisiana, discussed research work on pecan insects at the Shreveport station and presented control recommendations for pecan insects.

Protecting Stored Grain

RALPH R. LLOYD, JR., of Stauffer Chemical Company, served as panel leader for a discussion on stored grain insect control. E. H. Lloyd of the Louisiana Agricultural Experiment Station and L. C. Murphree, Coahoma Chemical Company, were other members of this panel and discussed various angles of insect control on stored grains, particularly on farms. Among other things, it was pointed out that the average barns or cribs were not constructed for satisfactory fumigation, and that it is very difficult to make these buildings air tight so that satisfactory fumigation can be done. The treatment of grain with pyrenone and other materials was discussed.

A panel discussion of livestock pest control was led by C. S. Smith, entomologist, Louisiana Agricultural Experiment Station, with Edward Broadus, Niagara Sprayer and Chemical Company, Dr. J. L. Lancaster, entomologist, Arkansas Agricultural Experiment Station, and Dr. B. F. Quisenberry, California Spray Chemical Company, as members of the panel. Mr. Broadus discussed livestock pest control based on several years of research which he had done for his company. Dr. Lancaster discussed the work being done at the Arkansas Experiment Station and gave their general recommendations for livestock pest control. Dr. Quisenberry also discussed research done by his company and mentioned particularly work with TEPP.

J. L. Crigler, of The Tobacco By-Products and Chemical Company, led a panel discussion on vegetable crop insect control. E. H. Floyd, of the Louisiana Agricultural Experiment Station discussed seed treatment for the prevention of injury by the seed corn maggot, wire worms and the southern corn root worm, and also control of thrips on onions and shallots. L. H. Bailey, of Thompson-Hayward Chemical Company, gave an interesting presentation on the general use of insecticides on truck crops and a special discussion of the new Louisiana Insecticide Act. Herman Mayeaux, Florida Agricultural Chemical Company, discussed latest control measures for insects on tomatoes and cucumbers.

One of the most interesting panel discussions of the conference

(*Turn to Page* 137)

In the Photos:

First photo (L to R): R. C. Gaines, entomologist, Bureau of Entomology and Plant Quarantine; Charles Lincoln; L. D. Newsom, entomologist, Louisiana Agricultural Experiment Station; and J. R. Roussel, La. Agricultural Experiment Station. These took part in panel discussion on cotton insect control.

Second picture (L to R): L. P. Harris, Cotton States Chemical Co.; A. E. Sidwell, Reasor-Hill Co.; E. A. Epps, chemist, Louisiana State Department of Agriculture and Immigration; and J. J. Joyce, Jr., Ouachita County agent. These participated in the panel discussion on the labeling of insecticides and education of retailers.

Lower picture, in meeting room. At rear, Herman S. Mayeaux, Florida Agricultural Chemical Co.; Norvel E. Thames, district agent, Louisiana Agriculutral Extension Service.

Front row: J. F. White, Shell Chemical Corp.; L. D. Newsom; and Roy C. Meeks, Niagara Chemical Co.

Problems of Soil Fertility Discussed at Chicago Meeting of

Middle West Soil Improvement Committee

By M. H. Slawson

SIGNIFICANT figures came from the Middle West Soil Improvement Committee's annual meeting in Chicago, Feb. 20, indicating that failure to use fertilizers in recommended quantities, affects farm profits adversely to an appreciable degree.

In the one-day conference, agronomists from the state colleges brought the manufacturers up to date on new developments in fertilizer use, covering methods and time of application, efficient liming and discussions on "granulated vs. powdered" materials.

One paper presented a carefully worked-out new theory on the nature of the reactions of soils and fertilizers. Consideration was also given to a program for encouraging increased use of lime and fertilizer. Offered in all the discussions were helpful tips on how manufacturers can use new knowledge, and, in closing the program, recommendations on minimum fertilizer grades were announced. These figures were for use in the 13 states comprising the Middle West Committee's sphere of activity, and were meant to guide manufacturers in production programs for the year beginning July 1, 1953.

W. R. Allstetter, vice-president of the National Fertilizer Association, Washington, D. C. presented the conference with figures on the profits lost by farmers who fail to follow college recommendations for use of fertilizer on their fields.

Using the State of Ohio as an example, Mr. Allstetter stated that, although usage of fertilizer is above average in that state, Ohio farmers are still losing net profits of $59,000,000 on corn, $12,000,000 on wheat, $1,500,000 on oats, $20,000 on sugar beets, $2,200,000 on potatoes and $20,000,000 on hay. His estimates were based on 1949-51 crop yields and extended to show what Ohio farmers might have earned had they followed the state university's advice.

"The opportunity for fertilizer expansion," Mr. Allstetter declared, "is the difference between what the colleges are recommending and what the farmers are doing. Research creates that opportunity and the extent to which we expand it, depends on the time, money and facilities devoted to research and the dissemination of knowledge derived from research.

"Dependence of our industry

In the Photos:

Top photo: Charles F. Martin, (left) and C. R. Martin (right) Miami Fertilizer Co., shown with Dr. C. O. Rost, University of Minnesota.

Second picture: Dr. Harold E. Myers, Kansas State College, (left) and Zenas H. Beers, executive secretary, Middle West Soil Improvement Committee.

Third photo: (L. to R.): Jim Gillie, Thurston Chemical Co.; Richard E. Bennett, Farm Fertilizers, Inc.; Howard L. Peterson, Lincoln Service & Supply Co., Inc.

Fourth: Tracy Adcock, (left) Swift & Co., Plant Food Division chats with Dr. William A. Albrecht, chairman of the soils department, University of Missouri.

Fifth: Ed Kitchen, Pacific Coast Borax Co.; and Sid Rydell, Swift and Co.

Lower photo: Warren Huff, Ashcraft Wilkinson; Robert Garn, Ohio Farm Bureau; H. S. Vothes, Virginia-Carolina Chemical Corp.

upon college research will increase as time goes by. It is to the direct interest of this industry, and a proper function for us, both as individual companies and as a trade association, to do everything in our power to support college research aggressively and continuously in every way possible."

The current market situation, Mr. Allstetter pointed out, gives particular importance to fertilizer economics.

Squeeze is On

"THE farmer is in a cost-price squeeze," he said. "He must keep his unit costs low, if he is to continue to prosper or even survive. Add to this the fact that emphasis in the new administration's department of agriculture appears to be on free markets and increased farm efficiency. Proper use of fertilizers would appear to be the tailor-made answer to the situation. For no other practice on the farm will contribute so greatly to reduced unit costs and increase efficiency," he declared.

Dr. F. W. Smith, professor of agronomy at Kansas State College, in a paper on "Methods of Applying Nitrogenous Fertilizer," reviewed data from his studies comparing numerous methods tried on corn and wheat. With respect to corn, he stated that there is some evidence that neither time nor method, under Kansas conditions, is an important factor in application of dry nitrogenous fertilizer, since all methods have given essentially the same results.

In wheat production, where anhydrous ammonia or ammoniated solutions were applied by injection, he said that yields were no different from those obtained from conventional application of dry nitrogenous fertilizer.

Spraying of nitrogenous fertilizer on wheat foliage was less effective, especially with respect to yield, he found, than applications made to the soil. He added, however, that there is some evidence that foliar applications are relatively more effective in changing protein content of wheat, than in increasing yield, under certain conditions. In adverse seasons he found urea sprays to be relatively safer than ammonium nitrate sprays. With respect to financial remuneration, he said, "There is no good reason to recommend foliar sprays for wheat production rather than conventional dry applications."

Can Build Gradually

DR. John T. Pesek, associate professor of agronomy, Iowa State College, in reporting on studies of "Time of Application of Fertilizer," discussed the advantages and disadvantages of spring or fall application. He cited experiments to illustrate how it is possible to build farm soil fertility gradually, as capital is available. It can be done in steps, he suggested, by investing part of the profits from one year's step to take the next one.

"The capital position of the individual operators," said Dr. Pesek, "rental arrangements, other enterprises in which the capital could be invested, and additional factors would help determine the route to increased soil fertility."

Dr. L. M. Turk, presently head of the soils department at Michigan State College, (but to become director of the Michigan Experiment Station on July 1,) presented two papers. In the first he stressed efficiency in use of fertilizers as highly important, regardless of whether supplies are short or in excess of demand. Fertilizer, he said, is not a "cure all" but is most effective when other good management practices are carefully followed.

In his second paper on "Program for Increased Lime and Fertilizer Usage," Dr. Turk used data from Michigan to illustrate the common need in other north central states, to raise soil productivity.

Michigan's current extension program is strong enough to encourage full use of the fertilizer industry's proposed expanded production, he asserted. However, he added that "Should farm income fall decidedly, an expanded educational program, emphasizing lower unit costs and higher farm income from heavier fertilization, would very likely be required."

Another Michigan State College scientist, Dr. R. L. Cook, professor of soils, presented an account of his use of radio-active phosphorus to compare the efficiency of granulated and powdered superphosphate. Some significant new knowledge on dissolution and migration of phosphorus from the granule was derived and further studies are in progress, he announced.

In a paper on "Some Aims of Soil Research," Dr. Wm. A. Albrecht, chairman of the soils department, Univ. of Missouri, declared that "Major determiners of fruitful research are an excellent theory, coupled with excellent tricks and techniques for testing it, so as to leave no doubt about the causes and effects concerned. Even during the testing of the theory, careful observation must still be part of the procedure."

He then continued with a technical account of how these principles had been followed in his studies, which resulted in "Shifting the concept of plant nutrition from the hydroponics, demanding dilute and repeatedly replenished solutions, to that of nutrient adsorption on the clay and then their exchange from there to the plant by the colloidal clay-root contact."

Dr. Garth Volk, head of the agronomy department and director of extension at Ohio State University, presented and discussed the recommendations of the agronomists on minimum fertilizer grades for 1953-54 and, closing the meeting, a film used at the Iowa State College television station was shown, to demonstrate how farmers of that state are learning how to improve their soils through this educational means.

The more than 400 persons in attendance broke all previous records, according to Z. H. Beers, executive secretary of the Middle West Soil Improvement Committee. He said that more than 100 companies and organizations, plus 13 state colleges and federal government departments were represented.

How weather, including rainfall and temperature, exerts heavy influence on abundance of N. Carolina

Boll Weevil Population

FOR the past several years, the North Carolina Agricultural Extension Service has cooperated with the U.S.D.A. personnel from the Pee Dee Experiment Station in Florence, S. C. in making cotton insect surveys in North Carolina. Survey results were reported on a county basis, with information being sent to county agents, insecticide dealers, cotton ginners and crushers, and others directly concerned with cotton production.

Boll Weevil Comparisons

CONSIDERING the state as a whole, weevils emerged earlier and in greater numbers in 1952 than last year; however, record breaking high temperatures and dry weather in June and July evidently suppressed weevil development to such an extent that mid- and late-season populations were in general about the same as those in 1951. Mid-season populations in 1951 and 1952 were not nearly as high as in 1950. In Figure 1, the average weekly infestations in untreated fields in 1950, 1951, and 1952 are presented.

Such a generalized presentation, however, does not bring out certain important aspects of the situation, which varied considerably among the different areas of the state. For example, in Scotland County (Southeastern N. C.), early infestations in 1952, though considerably higher than in 1951, failed to increase with the same uniformity as did the 1951 infestations. This was correlated with the extremely high temperatures and dry weather during June and July. On the other hand, in Gaston County, which received much more rainfall during June and July of 1952 than did Scotland, infestations were much heavier during mid-season.

The influence of weather on infestations in areas represented by Edgecombe and Cleveland Counties seemed to be somewhat similar to that in Scotland; however, one should note that cotton planting and weevil emergence are earlier in the Scotland area than in more northern and western counties. Because of this fact, young cotton in Scotland was exposed

Numerous factors enter in to how numerous boll weevil and other cotton pests will be in 1953. North Carolina Extension Service surveys show how high temperatures and dry weather in June, July, '52 suppressed weevils

to more weevil activity before the hot dry periods than cotton in such areas as Edgecombe and Cleveland. The extensive replanting in Cleveland is another variable which should also be considered.

Other Cotton Pests

FLEAHOPPERS and thrips: Some injury was noted, especially in Piedmont counties, but these pests were not a major problem in 1952. On the basis of several collections made in the lower Piedmont section, *Frankliniella fusca* (Hinds), *Limothrips cerealium* Hal., and *Thrips tabaci* Lind were the most common species of thrips encountered.

Red spiders: damage was less severe in general than last year. There was some defoliation by this pest in late July and August but in most cases infestations did not occur early enough to reduce yields appreciably.

Bollworms were again a major late-season problem in many sections, especially from mid-August to mid-September. Many bolls surviving the weevils were destroyed by this pest. Again, as in past years, too many growers failed to carry out an *adequate late-season control program.*

FIGURE 1

AVERAGE WEEKLY BOLL WEEVIL INFESTATIONS IN UNTREATED COTTON IN N. C.

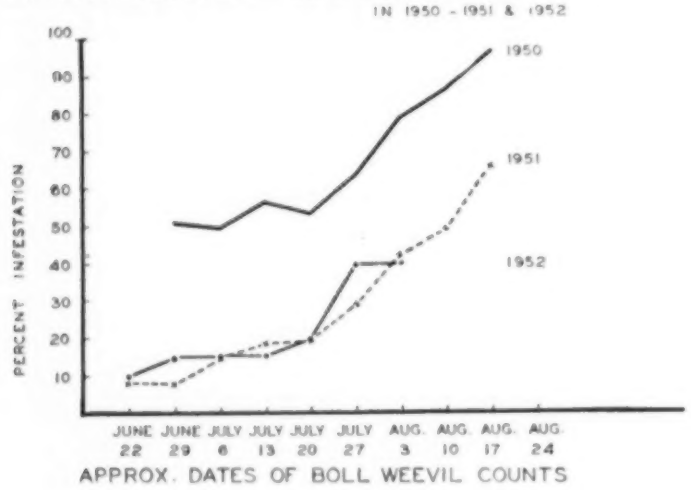
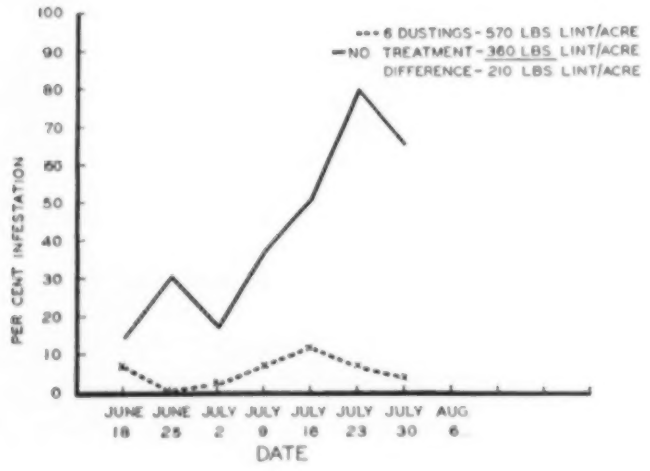


FIGURE 2

PROPERLY APPLIED INSECTICIDES PAY OFF WHEN WEEVIL POPULATIONS ARE HIGH



Treated vs Untreated

IN counties in which the cotton insect survey was conducted, square infestation counts were made in both treated fields, and in most cases the same fields were checked throughout the season. In some cases, treated and untreated fields were selected so they would be comparable in soil type, planting date, fertilization, seed, stand, etc. in order to obtain yield records and evaluate treatment results. Twenty of these comparisons were obtained by county agents.

Where there was little or no increase in yield due to treatment, infestations were generally too low to warrant treatment. In Scotland and Hoke Counties, many farmers did not realize the full benefit of their control efforts because the hot, dry weather during the latter part of July caused bolls to shed or crack. There were, however, certain local areas in which conditions were more nearly normal. In such cases, if weevil infestations were high, thorough and well-timed applications of insecticides paid off. (See Fig 2.) In several cases, intervals between applications were too long and in others, applications were not continued late enough.

Assuming that these twenty comparisons are representative of what happened on cotton farms in North Carolina in terms of boll weevil control, then it can be concluded that treated cotton yielded on an average, approximately 108 *lbs. of lint per acre* higher than did comparable untreated cotton This figure compares rather favorably with the average of the county agents estimates of the difference due to treatment which is 98 *lbs. of lint per acre.*★★

Suppliers' BULLETINS

Offers Film on "Krilium"

Availability of a new film describing the use and function of synthetic chemical soil conditioners has been announced by Monsanto Chemical Company, St. Louis, Mo. Entitled "Garden-Wise," the film is a sequel to "Soil Structure: Key to Productivity," an earlier movie which described the development and applications of "Krilium" soil conditioner. Prints of "Garden-Wise" may be obtained by writing the Merchandising Division, Monsanto Chemical Company, St. Louis 4, Missouri.

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Diamond Alkali Book Out

The Organic Chemicals Division of Diamond Alkali Co. has issued a new bulletin entitled "Organic Chemicals for Agriculture and Industry." Divided into three main divisions, insecticides, herbicides and industrial chemicals, the book gives complete descriptions of the company's products. Under insecticides, it discusses DDT, BHC, lindane, and "Miticide K-101" and presents solubility tables of help in determining solvents for use with technical DDT, BHC and lindane.

The section on herbicides gives a description of a number of toxicants, including 2,4-D (butyl ester technical and isopropyl ester), 2,4,5-T (butyl and isopropyl esters), 2,4-D, (Butoxy Ethoxy Propanol 2,4-dichlorophenoxyacetate) and 2,4,5-T, (Butoxy Ethoxy Propanol, 2,4,5-Trichlorophenoxyacetate). General descriptions are given on each product, with charts of physical and chemical properties, applications, packing specifications and cautions to be observed in handling and using the materials.

Industrial chemicals are handled in a similar manner, with hexachlorobenzene technical and tricholorobenzene technical being listed.

Copies of the handbook, well illustrated in color and ring-bound, are available from Diamond Alkali Co., Organic Chemicals Division, 80 Lister Ave., Newark, New Jersey.

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New "Gunjet" Offered

A new gun type nozzle, "Gunjet," just introduced by Spraying Systems Co., is said to give the user advantages in handling, easy spray adjustment, and wide range of capacities by low cost interchanging of orifice tips.

The "Gunjet" is built for effective operation at any pressure from 30 to 800 pounds per square inch, the makers state. The spray is adjustable by turning the handle, to give a complete selection range from a wide angle finely atomized full cone spray, through a full cone spray, to a straight stream. The entire unit is made of corrosion-resistant brass, with the orifice tips supplied in hardened stainless steel. These tips are offered in five different capacities to provide a capacity range of from ¾ to 30 gallons per minute. Capacities increase as pressures are increased. The hardened stainless steel tip is claimed to give extreme resistance to corrosion and abrasion, resulting in a long-life tip, that remains true in contour for dependable efficient spraying.

For complete information write for "Gunjet Bulletin 65," to Spraying Systems Co., 3230 Randolph Street, Bellwood, Illinois.

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Offers New Carrier

Summit Mining Corp., Carlisle, Pa., has announced a new inert insecticide carrier, "Ser-X", available now to the pesticide trade. The product, tested and approved by leading insecticide formulators, according to the company, is manufactured at the firm's new air-flotation plant at Dillsburg, Pa. Samples and information are available from the Summit Mining Corp., Summit, Pa.

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Varley Booklet Issued

The first edition for 1953 of the external house organ of James Varley & Sons, St. Louis, Mo. has been issued. The eight page booklet contains comments on current topics, clippings and excerpts from literature written in a friendly tone. It is available from the company, St. Louis 15, Mo.

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Link-Belt Co. Catalog

A 92-page catalog, designated as "Book 2289", has been issued by Link-Belt Company describing its complete line of screw conveyors and screw-feeders for use in the handling or feeding of fertilizer compounds or similar materials. Included are paddle mixers and pug mills of interest to the fertilizer manufacturer. The book also presents tables giving the weight in pounds per cubic foot, of various materials including phosphate rock, ammonium sulfate, bonemeal, cryolite, lead arsenate, agricultural lime, muriate of potash, and sulfur.

Address the Link-Belt Company, 307 N. Michigan Ave., Chicago 1, Ill.

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Quick-Change Hammer Mill

Screen replacements in a few seconds, during operations, are said to be possible by the new Schutte Quick-Screen-Change Hammer Mill,

manufactured by Schutte Pulverizer Co., Buffalo, N. Y.

Without stopping the mill or opening the cover, the screen can be withdrawn and replaced, the makers say. There is no need to remove any other parts. A lever lock is tripped and a wing nut loosened to release the hand guard. Safety against exposure to the hammers is provided.

Where varying materials and grist sizes require frequent screen changing, the new Schutte Hammer Mill will save considerable time and power, it is claimed.

A new bulletin, with complete details, will be mailed on request by writing to Schutte Pulverizer Co., 27 Clyde Ave., Buffalo 15, N. Y.

Union Develops "Skid-Proof" Bag

Union Bag & Paper Corp. has developed a special "non-skid" coating which applied to the face and back of paper multiwall bags during manufacture, gives the containers a high resistance to skidding. A variety of tests indicate the success of this treatment, according to the makers. One laboratory test consisted of a tilt table with connecting scales which measure in degrees the tilt angle required to make the bag slide off the table. The minimum slide angle for the treated bag was reported to be 42 degrees.

Another test, pictured above, was made by placing a full load of treated bags on a fork truck, moving forward at full speed, then applying the brakes suddenly at full force. The company reports that the stack of bags leaned slightly, then settled back to their original position even through the stop was forceful enough to lift the rear wheels off the ground as shown in the picture.

The makers say that the coating on bags provides new economy, better protection to bag and contents, saves labor and reduces likelihood of transit damage. Full particulars may be obtained from the Union Bag Co., Woolworth Bldg., New York, N. Y.

New Ryania Booklet

"Ryania, a Botanical Insecticide," is the title of an illustrated booklet just issued by S. B. Penick & Co., 80 Church St., N.Y.C. The booklet describes the results of ryania's use in effective control of the European corn borer, sugar cane borer, and cranberry fruit worm; and gives explicit directions for applications in each case. In addition, it presents the status of laboratory and field tests of ryania as an insecticide for stored grains, and outlines promising results of tests against sugarbeet webworm, Oriental fruit moth and other insects. The booklet concludes with sections on ryania's toxicology, pharmacology, chemistry, physiological effects, also a complete list of literature cited. The book is available upon request.

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Heads Continental Can Div.

Benjamin C. Betner, Jr., was elected a vice-president of Continental Can Company at a meeting of the board of directors on February 18, according to General Lucius D. Clay, board chairman.

Mr. Betner was formerly president of the Benjamin C. Betner Company, whose assets and business were recently acquired by Continental. In his new capacity, he will be in charge of the Betner Division, which will continue as a separate unit, manufacturing small and medium sized bags from various materials including paper, foils, cellophane, glassine, plastics and wax paper.

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White to Texas Firm

A. N. White, for the past two and a half years the Lower Rio Grande Valley associate county agent in charge of entomology, has joined the staff of Hayes-Sammons Chemical Co. of Mission, Tex., Raymondville, Tex., and Reynosa, Tamps., Mexico, as an entomologist.

Vice-president Thos. B. Sammons, Jr., said the addition of Mr. White brings to eight the number of entomologists employed by the firm which distributes insecticides, fungicides and sulphurs in southern United States, Mexico, and other cotton and vegetable producing areas of the world.

Before becoming associate county agent for Hidalgo, Cameron and Willacy counties of the Valley, Mr. White worked for two years for the U. S. Department of Agriculture division of pink bollworm control in Oklahoma. Prior to that he was with a Houston chemical company.

He became well known in south Texas in the past three seasons through his news releases about the prevalence of cotton pests. Numerous farmers and cottonmen made periodic reports to him of insect conditions which he compiled into widely-distributed news reports.

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Danziger to Head Division

J. M. Baird Company has announced that Max J. Danziger has been placed in charge of the agricultural chemicals and fertilizer division of the company. He will make his headquarters in New York City.

WASHINGTON *Report*

AS the pesticide industry approaches the active season of the 1952-53 growing year, two serious problems are faced. First is the sales outlook in view of the depressed price situation and long inventory position; and two, the threat of new Federal legislation.

* * * * * *

There have been some serious price drops on technical agricultural materials which have brought rather drastic effects, including that of actually limiting purchases. This is aggravated also by losses taken by formulators, distributors and dealers who have been holding stocks of the finished materials. Aldrin, dieldrin and toxaphene dropped quite sharply in price just before the first of the year. BHC has been in a weakening position for the past 6 to 9 months but since there has been very slight sales activity, the price decline in BHC has not been as apparent as in the three materials mentioned above.

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Many industry spokesmen are at a complete loss to explain what has happened in recent weeks to the price situation with regard to technical DDT. Just before the first of the year, it was evident to many that technical DDT was firming up considerably. With production falling off appreciably during the October and November period, inventories, at least in the hands of formulators, had been reduced. Also towards the end of the year, rather important purchases of finished wettable powders were announced by various Government agencies. It was felt that with the approach of 1953, there would be an increase of some 4-5c lb. from the low 24-25c. However, such hopes were dashed by the announcement of one of the larger producers of a 23c lb. price, effective just after the first of the year.

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Following this announcement and the actual placing of government purchase orders for deliveries of the finished materials during the first 3 and 4 months of 1953, many industry spokesmen were still optimistic about a possible change in the price situation. However, as of this writing, and in spite of the fact of additional government and quasi-government procurements, the 23c price on "a spot basis" is still prevalent throughout the industry. The more pessimistic spokesmen believe that this price will remain at least on a spot basis until formulators actually start to build their inventories. However, many other industry spokesmen are quick to point out that with the depressed price of DDT, there is a great deal of hesitancy on the part of formulators and distributors to procure materials except what they actually need on a day-to-day or week-to-week basis.

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It is felt in general that inventories of finished insecticides are heavy only in the southeastern cotton area. Many feel that inventories of finished materials in other parts of the country are at best only "fair" and could be very easily wiped out by the appearance of any kind of serious infestation. However, the depressed price has had a bad effect on both domestic buying and also on the export demand for DDT as well as for other insecticidal materials.

* * * * * *

The price of 2,4-D and 2,4,5-T also took a substantial decline in the early part of January, and it is felt that this has sounded a further pessimistic note on the early buying program which the industry has been favoring during the past several years.

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SEVERAL bills have been introduced in the new Congress to implement decisions made as a result of the Delaney Committee investigation last year. Representative Delaney has already introduced two bills to require the pre-testing of cosmetic and food additives. Representative Miller, a member of the Delaney Committee, who has been in disagreement with the majority of the findings of the Delaney Committee, has introduced his own bills.

While Representative Miller, like Congressman Delaney, favors pre-testing and government approval of food and cosmetic chemicals before they are marketed, he points out that the Food & Drug Administrator's power over industry should be trimmed. Congressman Miller also wants to see a limitation placed upon the length of time that the Administrator may consider a case and will include the establishment of an appeals procedure. No appeals mechanism is contained in the Delaney bill.

* * * * * *

It is the intention of Congressman Miller to write a separate bill for pesticides instead of including it in the food additive bill. Representative Miller would place the responsibility for the control of pesticide use with the Agriculture Department instead of with the Food & Drug Administration. It is Representative Miller's plan to write three bills, one covering the chemical additives in foods, the second on chemicals in cosmetics, and the third on pesticides. The bills were scheduled for introduction by the end of February.

* * * * * *

Many industry spokesmen are reluctant to make any predictions as to the kind of insecticide season that is in store for the industry this year. The depressed price condition makes it virtually impossible to predict with any degree of accuracy what kind of early buying there will be, but it is reasonable to assume that the depressed price situation has had a serious deterring effect on the early movement of materials. Stocks of finished materials in the hands of formulators, distributors and dealers have been affected tremendously by the sharp drop in price.

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Even though many of the floor stocks of these materials at the distributor and formulator level were protected by the manufacturer, never-

(*Turn to Page* 113)

Thompson-Hayward Finishes Construction of New Orleans FORMULATION PLANT

THOMPSON-Hayward Chemical Co. announced the recent completion of its new formulating plant at New Orleans, La. According to the company, this new unit represents another step by the insecticide industry to insure adequate supplies of pesticides for the south.

The first Thompson-Hayward branch in this area was established in 1928 when a warehouse and sales force were set up in New Orleans. This original operation has grown until today it comprises a plant, office, laboratory and warehouse facilities covering two square blocks in central New Orleans. These new facilities are in keeping with the firm's policy of developing branch operations to meet the requirements of the south, according to the company's statement.

"In recent years the rapid growth of the south and their increased requirements for agricultural insecticides has demanded more and more consideration by the insecticide industry," a company spokesman observed. "One of the primary problems has been to provide adequate tonnage of both liquid and dry formulations at the proper time to protect the large agricultural market of the southern states. As new insecticides and formulations become available, there is also the problem of being sufficiently flexible to have the correct formulation available on short notice. The new Thompson-Hayward formulating plant has been completed with sufficient facilities to satisfy today's demand and at the same time allows for future expansion as the south continues to grow," it was pointed out.

The new formulating plant located in New Orleans has the advantage of being in the center of the agricultural south and is also in a position to service the increasing export trade which is continuing to develop to central and south America through New Orleans.

Tank storage in the amount of 110,000 gallons has been provided for the necessary solvents required for liquid insecticide formulations. Their new plant also provides for a finished blending operation capable of formulating of 70,000 gallons of liquid formulations per week.

A capacity of over 200 tons per week of insecticide concentrates is possible through the installation of completely modern roller mills. Both horizontal ribbon and vertical screw type mixers are available and can produce in excess of 500 tons of finished cotton poisons, wettable powders and dusts per week.

Considerable effort, time and expense, has been put forth on this new plant which is based largely on years of experience encountered by Thompson-Hayward in their manufacturing operations at Kansas City. Equipment and formulation procedures have been set down after careful study by research laboratory and chemical engineers located both at New Orleans and Kansas City. Primary formulation development and laboratory control procedures have been standardized by the Thompson-Hayward laboratory.

In addition to the laboratory

(*Turn to Page* 129)

In the Photos

Upper picture: Exterior view of new plant and warehouse of Thompson-Hayward Chemical Co. in New Orleans.

Below: Interior view of warehouse showing ample storage space for all types of finished pesticides. The new plant can formulate 70,000 gallons of liquid formulations a week and more than 500 tons of finished cotton toxicants, wettable powders and dusts, can be made.

Ample Supplies of K_2O Available, but delay in taking delivery may slow distribution of

POTASH

HAVING seen an almost constant increase in both production of and demand for potash over the past fifteen years, the potash industry expects to be in a satisfactory position to meet agricultural requirements for 1953, providing present rate of production is maintained. Domestic output is at an all-time high, with the supply picture appearing brighter with the recent entry of new firms into the field.

According to executives in various companies supplying potash to the fertilizer manufacturing trade in the U. S., the supply outlook for 1953 is good, except that a lag in ordering for the season's requirements may mean a transportation bottleneck later on. As one sales manager put it, "We have plenty of material, but it isn't moving out of Carlsbad fast enough. Our company has its fingers crossed that there will be enough freight cars available to take care of the rush which is bound to come when the need is immediate and everyone orders at once."

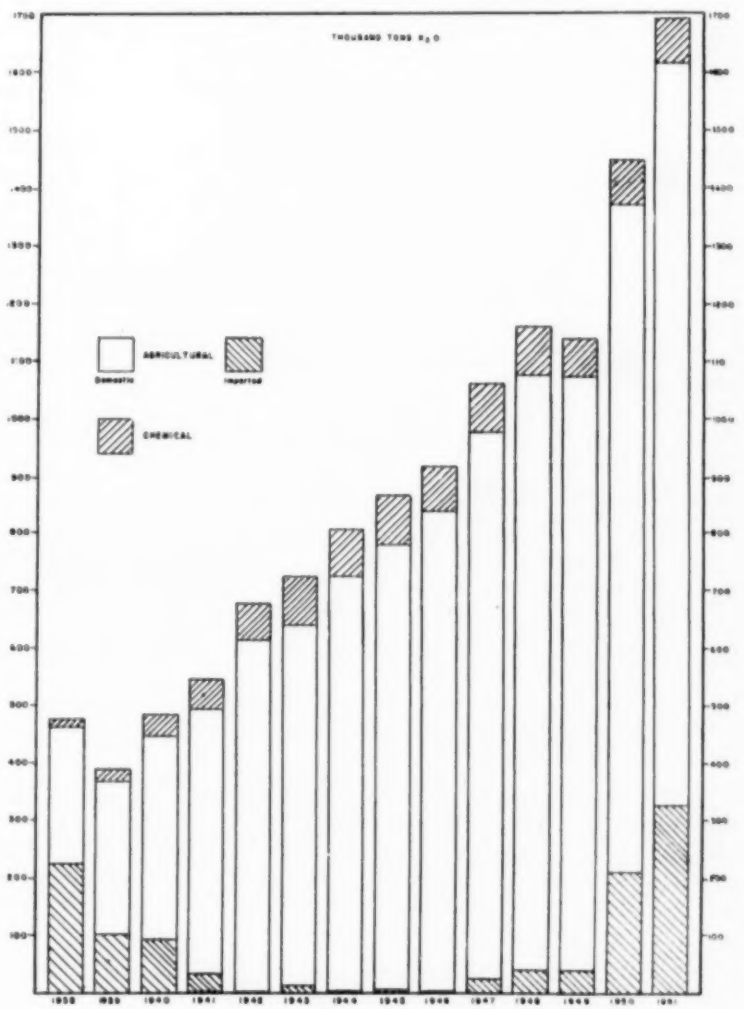
The American Potash Institute which for many years has maintained records of potash deliveries in the United States, Puerto Rico, Cuba, Hawaii and Canada, estimates that total deliveries for 1952 will amount to some 1,780,000 tons K_2O as compared to 1,744,173 tons K_2O delivered during the fiscal year of June, 1951 through May, 1952. Since the present fiscal year is not completed, the estimate given by A.P.I. is based on present indications. The figure includes some 200,000 tons of imported K_2O.

The U. S. Department of Agriculture, using a slightly different base for calculations, estimates that the supply of potash for agricultural purposes in the U. S. will be in the neighborhood of 1,850,000 tons for 1952-53, which represents an increase

Figure 1

POTASH DELIVERIES – AGRICULTURAL & CHEMICAL

NORTH AMERICA



of 17% over the amount available in 1951-52. (The U.S.D.A. includes the potash from nitrate of soda-potash and organic forms such as tobacco stems, cottonseed meal and other materials which contain potash and are used in fertilizers. Although they do not change the over all picture significantly, they do cause small differences in the figures.)

U. S. Can Carry Load

WITH domestic production of potash on the increase, it is regarded as fairly certain that the U. S. could carry out its present fertilization program independent of K_2O imports. At the present time, of course, there is no necessity of doing this, but in the event of another world upheaval it is encouraging to know that the domestic supply could carry the burden. Imports, as noted before, will account for about 200,000 tons of potash this year. The report for 1951-52 showed imports totaling 283,129 tons.

A chart showing potash deliveries, for both agricultural and chemical use, portrays in a graphic manner the consistent upward curve of potash use. While chemical use has remained relatively constant, agricultural consumption has had a steady increase with the exception of 1939 and 1949 when the curve takes a slight dip. This chart, reprinted here through the courtesy of the American Potash Institute, illustrates the increasing importance of this mineral. The figures for 1952-53 will call for an even taller column, according to present estimates.

Domestic supplies have been improving steadily. The recent appearance of two new companies in the picture has made the situation even more secure for the U. S. fertilizer manufacturer.

The participation of Southwest Potash Corp. and Duval, with Freeport Sulphur Co. said to be contemplating potash production, will enable the industry to increase the annual tonnage of potash to a considerable degree even above today's impressive figures.

Cotton States Branch, ESA, Names Arant Chairman for '53

THE 27th annual meeting of the Cotton States Branch of ESA was held in the Jung Hotel in New Orleans, La. on Feb. 9, 10, & 11th. The meeting was held concurrently with the 50th anniversary meeting of the Association of Southern Agricultural Workers. One-hundred and sixty-four members registered for the three day meeting.

Chairman K. L. Cockerham, Extension Entomologist of Louisiana, in his opening address, urged a "return to fundamental research in entomology." He pointed out that by fundamental or basic research, he meant projects designed to obtain information or data on the life-history, habits, ecology or physiology of insects, and those projects designed to determine how an insecticide kills. He stated that in many cases we have lost sight of the long-range objectiveness of research in a fog of short-sightedness, and in a "false expediency of immediate chemical control or eradication."

Dr. Charles E. Palm, president of the newly formed Entomological Society of America, represented the parent association at the Branch meeting. In his address, he congratulated the Cotton States Branch for the honor of holding the first Branch meeting of the new Entomological Society of America.

Dr. Palm discussed the broad challenge that entomology offers today, pointing out that this year marks a century of entomological progress in North America. He stated that it has been a century of amazing progress in the profession, high-lighted by a growing realization of the immense value of entomology to our welfare.

Dr. F. S. Arant, Head of the Dept. of Zool. and Ent., A.P.I., Auburn, Ala. was elected chairman of the Cotton States Branch, ESA, for 1953. Other officers elected were: vice-chairman Hiram C. Young, B.E.P.Q., Florala, Ala.; Branch representative on Governing Board of ESA—Dr. M. D. Farrar, head, Dept. Zoology & Entomology, Clemson College, Clemson, S. C.; Secretary-treasurer—L. C. Murphree, Coahoma Chemical Co., Clarksdale, Miss.

The program committee comprised Dr. F. S. Arant, Dr. C. H. Bradley and Dr. L. D. Newsom, chairman. The local arrangements committee was composed of L. J. Gecnel, A. L. Dugas and Edwin Lott.

A total of fifty-three papers were presented during the three day meeting, covering a wide variety of

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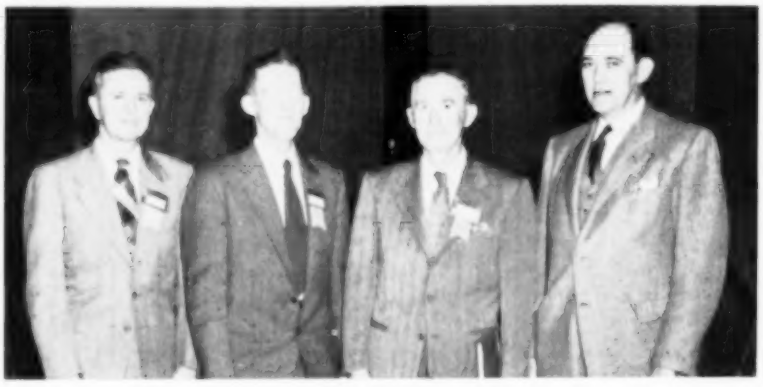
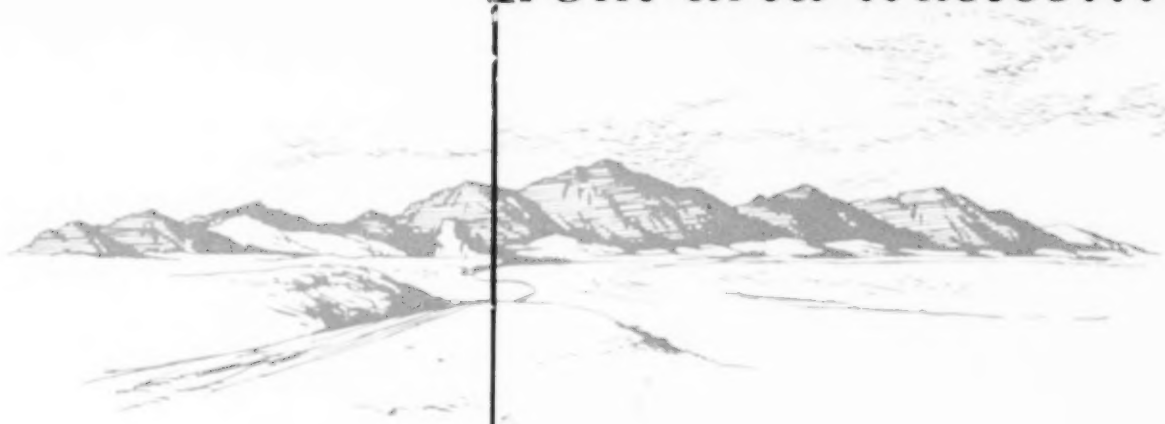


In the Photo

Left to right: L. C. Murphree, secretary-treasurer, Cotton States Branch, ESA.; A. L. Hamner, retiring vice-chairman; Kirby L. Cockerham, retiring chairman; and Dr. Charles E. Palm, president, Entomological Society of America.

from arid wastes...



CHEMICALS FOR BUMPER CROPS

The American Potash plant at Trona, in the midst of the California desert area, is situated beside a vast stockpile of raw chemicals essential to agriculture. Under the brand names of *Trona* and *Eston* these chemicals in processed and refined forms, are playing an ever increasing part in growing better and bigger crops. Trona Potash is an essential element in mixed fertilizers. Trona Borax is used to correct soil deficiencies. Eston products include fumigants, defoliants, insecticides and herbicides.

In preparing soil, fertilizing plant growth and protecting it from the attack of destructive insect life, American Potash makes a vital contribution to the greatest industry of all—agriculture.

You can buy Trona-Eston agricultural chemicals with confidence—they are *proved* by many years of research and field usage.

AMERICAN POTASH AGRICULTURAL CHEMICALS

ESTON BRAND		TRONA† BRAND
ALKRON* (parathion formulations)	ESTONOX* (toxaphene formulations)	Muriate of Potash
BROMOFUME* (soil fumigants)	TETRON* (Tetraethyl pyrophosphate formulations)	Sulphate of Potash
ESTOMITE* (residual type miticide)	TUMBLEAF† (defoliants)	Borax, Technical
ESTONATE* (DDT dust concentrates and emulsified solutions)	TUMBLE-WEED† (herbicides)	Sodium Pentaborate
		TRONABOR* Pentahydrate
		Borax (crude)

*Trade Mark Registered †Trade Mark American Potash & Chemical Corp.

TRONA
INDUSTRIAL AND AGRICULTURAL CHEMICALS
ESTON CHEMICALS

American Potash & Chemical Corporation

*Offices** 3030 West Sixth Street, Los Angeles 54, California
122 East 42nd Street, New York 17, N. Y.

* ESTON CHEMICALS DIVISION
3100 East 26th Street, Los Angeles 23, California

*Plants** Trona and Los Angeles, California

Calmonite

AMMONIUM NITRATE-LIME

20.5% NITROGEN

2 FERTILIZERS IN 1
Contains 10.25% quick-acting *nitrate* nitrogen.
Contains 10.25% longer-lasting *ammonia* nitrogen.

GREEN PELLETS READY TO USE
Sized for flow and ease of application in broadcasting, top dressing, side dressing, and irrigation. Non acid-forming.

ECONOMICAL SOURCE OF N
At low cost, Calmonite furnishes Nitrogen in the 2 forms needed by all plants — for rapid, early vigorous growth and sustained development.

SUPPLIES CALCIUM, TOO
Contains 35% to 40% calcium carbonate, secondary plant-food essential to soil productivity and good crop yields.

NOW AVAILABLE, F.O.B.
Regular Atlantic and Gulf ports, in even-weight, 6-ply paper bags with 2 bituminous liners.

LOOK AT CALMONITE!
Write for a sample and for additional information today.

EXCLUSIVE DISTRIBUTORS FOR
RUHR-STICKSTOFF AKTIENGESELLSCHAFT,
BOCHUM, GERMANY

H. J. BAKER & BRO.
600 Fifth Avenue, New York 20, N. Y.
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H. J. BAKER & BRO.

you too can improve your

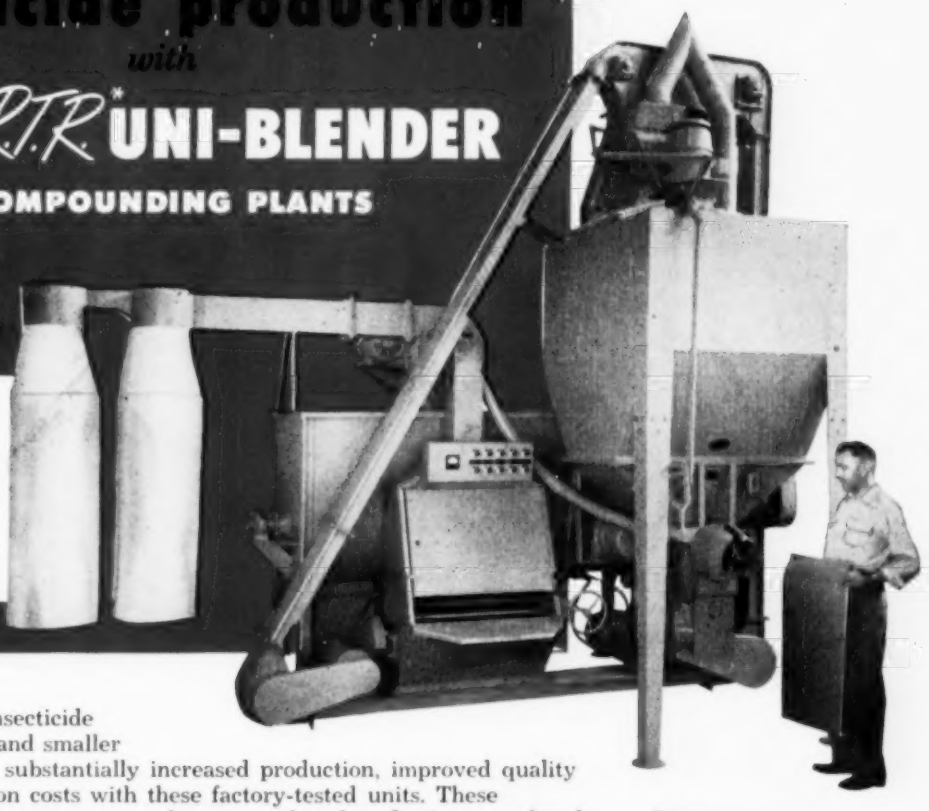
insecticide production

with

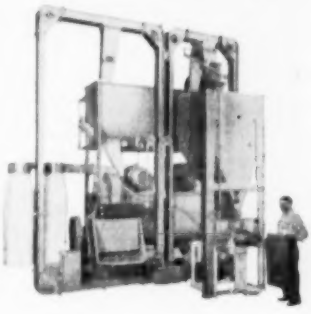
A. E. Poulsen & Company R.T.R.* UNI-BLENDER COMPOUNDING PLANTS

*R.T.R.—
Ready-To-Run
U. S. Pat. No. 2,591,731

from base materials to finished product in one complete, compact, Ready-To-Run unit.

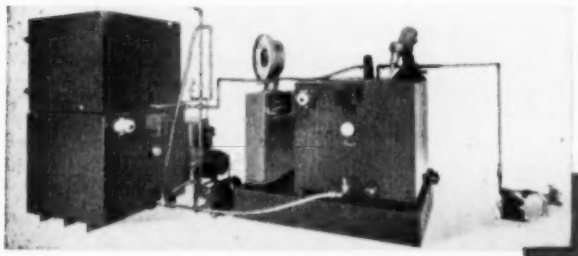


Many of the largest insecticide producing companies and smaller processors alike have substantially increased production, improved quality and reduced production costs with these factory-tested units. These Ready-To-Run plants MIX, BLEND and PACKAGE dry, free-flowing, powdered materials, including many formulas involving liquid impregnation. Many users report production increases of 200% to 300% with R.T.R. Uni-Blender Compounding Plants.



STANDARD TYPE: Mixes and blends dust concentrates with diluents to produce and package field strength insecticides of consistently uniform superior quality. Produces from three to four 40 cu. ft. batches per hour with minimum labor.

DUAL TYPE: Performs *three* processes of production: 1) Mixes, blends and packages dry, free-flowing powdered materials. 2) Compounds finished products from ingredients requiring reduction in particle size (to −325 mesh if desired). 3) Compounds finished products from ingredients involving liquid impregnation. Handles 40 cu. ft. batches.



R.T.R. Uni-Blender Liquid Formulating Plants provide for liquefying, blending and injection of specific technical grade toxicants required for the formulation of numerous concentrates and liquid spray chemicals.

Write today for technical bulletins CP-310 and LF-110.

A. E. Poulsen & Company

A. E. POULSEN AND COMPANY

Established in 1939

ENGINEERS AND MANUFACTURERS

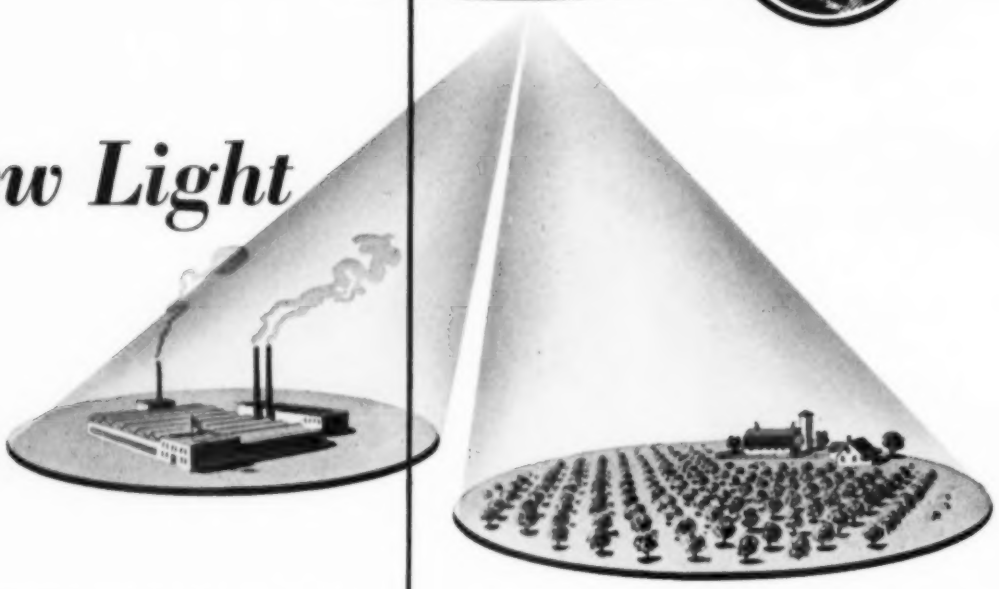
Materials processing and materials handling equipment

3305 EAST SLAUSON AVENUE, LOS ANGELES 58, CALIFORNIA

TRONA
INDUSTRIAL AND AGRICULTURAL CHEMICALS

ESTON CHEMICALS

New Light



TRONA-ESTON CHEMICALS INCLUDE:

TRONA† BRAND

Lithium Chemicals
Muriate of Potash (agricultural & chemical grades)
Potassium Pentaborate
Salt Cake
Soda Ash
Sodium Pentaborate
Sulphate of Potash (agricultural grade)

THREE ELEPHANT BRAND*

Borax, Technical (coarse and fine granular-powdered)
Boric Acid (Technical and U.S.P.)
PYROBOR* Dehydrated Borax, Technical (coarse & fine granular)
TRONABOR* Pentahydrate Borax (agricultural & refined grades)

ESTON BRAND

ALKRON* (parathion formulations)
BROMOFUME* (soil fumigants)
ESTOMITE* (residual type miticide)
ESTONATE* (DDT dust concentrates and emulsifiable solutions)
ESTONOX* (toxaphene formulations)
Organic bromides
TETRON* (Tetraethyl pyrophosphate formulations)
TUMBLEAF†
TUMBLE-WEED†

*Trade Mark Registered
†Trade Mark American Potash & Chemical Corp.

ON OLD SUBJECTS...

Agriculture and industry are as old as written history. Old subjects it is true, but through the years chemistry has altered established formulas and radically changed the accepted methods of both.

American Potash and Chemical Corporation recognizes that nothing is constant but change. Since its earliest beginnings in 1862 this Company has always endeavored to move forward in research methods and facilities. It has steadily added to its line of basic raw materials for the chemical processing field. In its recent acquisition of the Eston Chemicals, Inc., it is following its staunch policy of expanding facilities and services to meet requirements of present and future customers.

PROVED CHEMICALS FOR INDUSTRY AND AGRICULTURE

TRONA
INDUSTRIAL AND AGRICULTURAL CHEMICALS

ESTON CHEMICALS

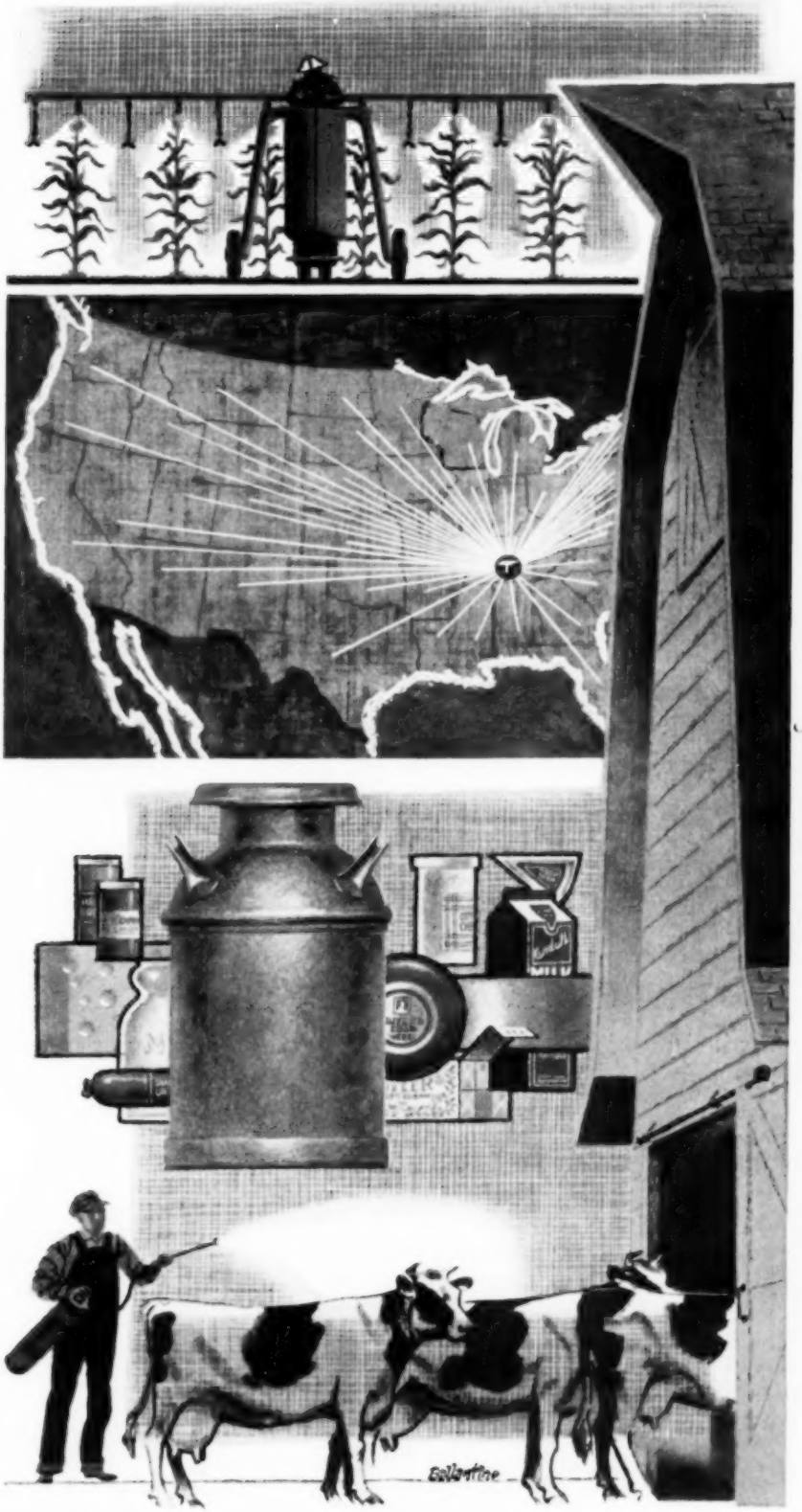
American Potash & Chemical Corporation

Offices — 3030 West Sixth Street, Los Angeles 54, California
122 East 42nd Street, New York 17, N. Y.

ESTON CHEMICALS DIVISION
3100 East 26th Street, Los Angeles 23, California

Plants — Trona and Los Angeles, California

THERE'S A TOUCH OF TENNESSEE IN WISCONSIN DAIRIES



In Wisconsin dairy barns, in cornfields, truck gardens, and your own back yard, you'll find agricultural chemicals from TENNESSEE. Lindane from TENNESSEE effectively controls more species and types of insect pests than any other insecticide ever used. TENNESSEE also supplies DDT, technical and High Gamma Benzene Hexachloride, 2, 4-D and 2, 4, 5-T, for uses ranging from household sprays to weed killers, from crop sprays and dusts to animal sprays and dips.

Wisconsin industries rely on TENNESSEE for chemicals, charcoal and Charkets for industrial uses, ferro alloys and pig iron for farm implements. Many other basic materials from TENNESSEE are used by key industries everywhere. That's why TENNESSEE is known as an industry serving all industry.

TENNESSEE
PRODUCTS & CHEMICAL
Corporation
NASHVILLE, TENNESSEE

Producers of: **FUELS • METALLURGICAL PRODUCTS • TENSULATE BUILDING PRODUCTS • AROMATIC CHEMICALS WOOD CHEMICALS • AGRICULTURAL CHEMICALS**

AVAILABLE NOW

Good news! Phillips *66* Ammonium Sulfate is available *now!* It is *dry-cured*. Dry-curing removes excess moisture—prevents caking. Uniform crystals flow freely—mix easily. Contains 21% nitrogen. Ideal for mixed goods manufacture and for direct application for all farm crops.

Contact us now for immediate shipment of bulk or bagged Phillips *66* Ammonium Sulfate.

Phillips also produces Nitrogen Solutions, Ammonium Nitrate, and Anhydrous Ammonia. Write our nearest district office for full information.

PHILLIPS CHEMICAL COMPANY

A Subsidiary of Phillips Petroleum Company

FERTILIZER SALES DIVISION · BARTLESVILLE, OKLAHOMA

DISTRICT SALES OFFICES:

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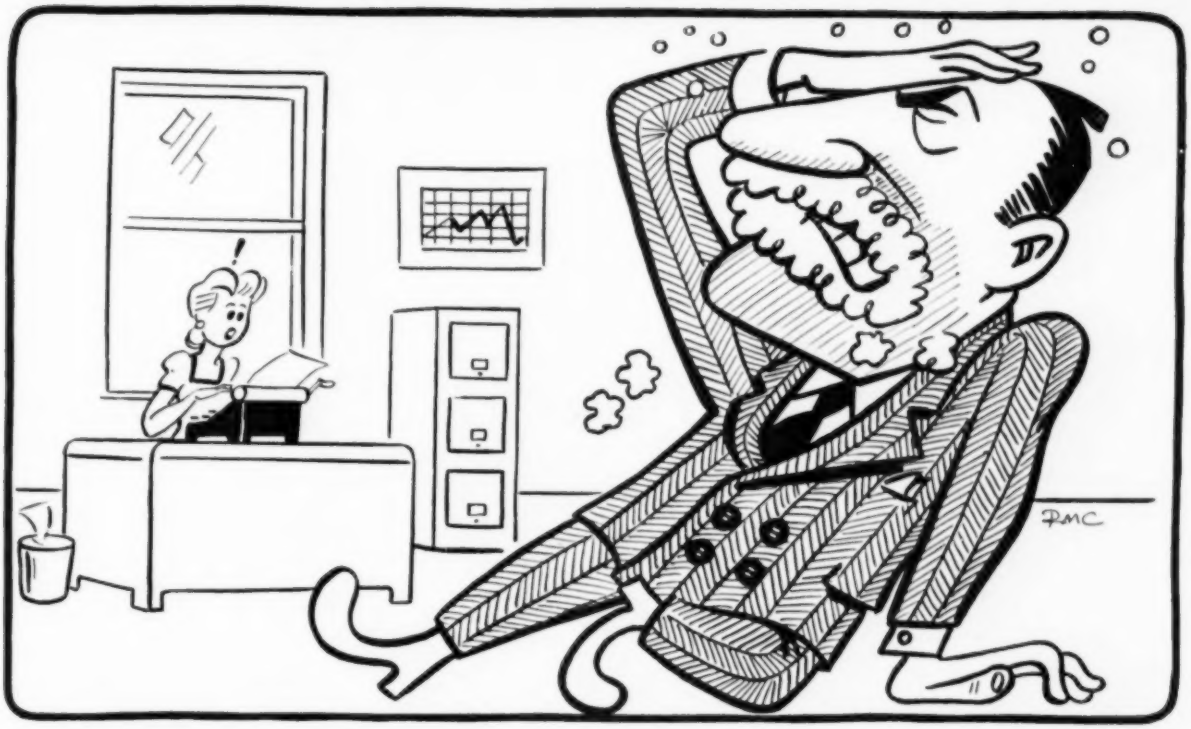
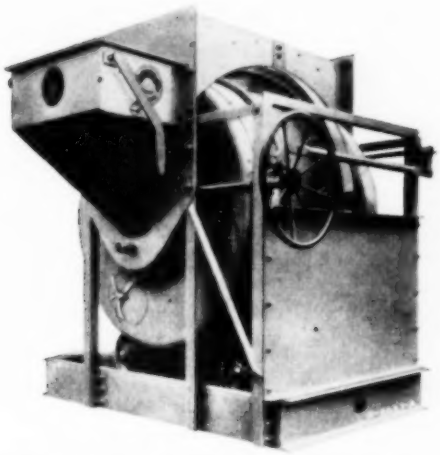
HOUSTON, TEX.—604 City National Bank Bldg. • AMARILLO, TEX.—First National Bank Bldg. • OMAHA, NEB.—WOW Bldg.
PASADENA, CALIF.—604 Citizens Bank Bldg. • NEW YORK, N. Y.—80 Broadway • BARTLESVILLE, OKLA.—Adams Bldg.



He can't stand that slow mixing cycle!



THE MODERN WORTHINGTON DRUM-TYPE FERTILIZER MIXERS are available in capacities of ½, 1, 2 and 3 tons.

But you don't have to go *that* far, chum. Give us a chance to help. We've got a mixer that can boost your daily output as much as 10%. It's the Worthington fertilizer mixer with an engineered blade design that gives the fastest mixing cycle we know of. You save time with every batch and can set up the mixer for continuous agitation. Mixing is thorough, too, and special mixer design eliminates these other big problems for you:

CORRODED DISCHARGE CHUTE—the Worthington discharge chute is out of the mixer during mixing time. Proper balance makes manual control of chute easy. Pneumatic controls are also available.

HARMFUL DUST SPREADING—the Worthington fertilizer mixer's charging and discharging chutes are designed for dustproof operation. A sealing disc attached to the discharge chute revolves with the drum to assure dustproof mixing.

HEAVY HORSEPOWER CONSUMPTION — Worthington's specially engineered anti-friction construction assures peak operating efficiency with lowest possible horsepower consumption.

YR.3.3

WORTHINGTON

Industrial Mixers

SEND THIS COUPON TODAY to learn more about how to reduce mixing time and cost with a Worthington fertilizer mixer. There's a skilled Worthington engineer near your plant. At your request, he'll be glad to call on you.

Worthington Corporation C
Industrial Mixer Division
Plainfield, New Jersey

Name .....

Position .....

Address .....

City ..... Zone ..... State .....

☐ I'd like more information. ☐ I'd like to talk with an engineer.

Flexible STRENGTH built in

Flexibility and **strength** are inherent qualities of Fulton's famous W.P.P.L. (Waterproof Paper Lined) Bags. These sturdy, easy-to-handle textile bags protect your product against moisture and odors. Your product is always sealed in an inner lining of plastic or crinkled Kraft paper, laminated with special adhesives to either cotton or burlap — **nothing can get in — or out!** W.P.P.L. Bags are economical, but do the job of more costly rigid containers. Your nearest Fulton factory will give you complete details. Write today.

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Sell

these 4 Sinox Dinitro Products

SINOX
SINOX W
SINOX PE
SINOX GENERAL

FOR THESE 4 TYPES OF WEED CONTROL:

PRE-EMERGENCE
SELECTIVE
PRE-HARVEST
CHEMICAL WEED MOWING

After 15 years of research and development we now offer SINOX — the original dinitro weed killer — in 4 formulations to give you added sales in all 4 types of weed control. Write for prices, marketing agreement and other information today.

SINOX

For safe, selective weed control in onions, flax and grain.

SINOX PE

For pre-emergence spraying of cotton, beans and peas; early summer treatment of alfalfa and clover.

SINOX W

For selective spraying of seedling alfalfa, onions, flax and grain; also as preharvest spray on alfalfa, milo, peas, flax, castor beans, sudan grass and clover.

SINOX GENERAL

For chemical weed mowing in orchards, vineyards, ditches and roadsides. Preharvest spraying, potato vine killing, and for use in established alfalfa and strawberries.

other Standard Agricultural Chemical Products

HERBICIDES

STANTOX "64"
2,4-D Amine Salt
STANTOX "P-44"
2,4-D Ester
STANTOX "P-50"
Low volatile 2,4-D Ester
STANTOX "T-45"
2,4,5-T Ester
STANTOX "22" BRUSH KILLER
Low volatile esters of 2,4-D & 2,4,5-T
STANTOX "LV-45"
Low volatile 2,4,5-T Ester
STANTOX "SODIUM TCA" (90%)
STANTOX MCP
STANTOX IPC
STANTOX CHLORO IPC

DORMANT FRUIT SPRAYS

ELGETOL
ELGETOL "30"
ELGETOL "318"

INSECTICIDES

STANPHOS "50"
TOXAPHENE EMULSION
DDT EMULSION
PARATHION EMULSION
PARATHION WETTABLE POWDER
STANICIDE
and others

STANDARD AGRICULTURAL CHEMICALS, Inc.
1301 Jefferson Street, Hoboken, N. J. · 429 Forum Building, Sacramento, Calif.

Is it Time to Redesign Your Bags?

Well-designed, expertly printed V-C Multiwall Bags help build customer confidence in your products and your company. Good-looking bags have real sales appeal. If your multiwall bag trade design looks like years ago, call on V-C's experienced art service.

V-C Multiwall Bags are made of top-quality materials, carefully constructed to stand rough, tough treatment in handling, in shipping and in storage. They are available in standard sizes in the following types: sewn open mouth, sewn valve, sewn valve with sleeve or with tuck-in sleeve.

Now is the time to discuss your bag problems with a V-C representative.

Virginia-Carolina Chemical Corporation

BAG DIVISION: 9th and Perry Streets, Richmond, Virginia

DISTRICT SALES OFFICES:

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FORMULATE NOW WITH THESE MONSANTO HERBICIDES...

2,4-D . . . The thoroughly proved translocated weed killer that destroys the entire growth, including roots. Here is a volume sales item—be sure you can meet the demand.

CHLORO IPC . . . Outstanding for controlling grasses in cotton fields. Kills crab grass, annual bluegrass, annual rye, annual fescue, velvet grass, chickweed. Can be sprayed or dusted on crops.

MCP-90 . . . This new Monsanto compound (2-Methyl-4 Chlorophenoxyacetic acid) is a hormone-type killer that knocks out 101 different kinds of weeds. Has action similar to 2, 4-D, but is less injurious to flax, some grasses, cereal crops and legumes. Usage is increasing—get your share of the business.

SEND *for this newly printed bulletin on MCP-90. Contains formulating information and a complete list of all weeds affected by the compound. Write* MONSANTO CHEMICAL COMPANY, *Organic Chemicals Division, 800 North Twelfth Blvd., St. Louis 1, Mo.*

MONSANTO HERBICIDAL CHEMICALS

2,4-D ACID
2,4-D ISOPROPYL ESTER
2,4,5-T ACID
2,4,5-T ISOPROPYL ESTER
CHLORO IPC
IPC
MCP-90
SANTOBRITE* (Sodium Pentachlorophenate, Technical)
SANTOPHEN* 20 (Pentachlorophenol, Technical)

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO INSECTICIDAL CHEMICALS

SANTOBANE* (DDT)
SANTOCHLOR* (Para-Dichlorobenzene)
SANTOPHEN 20 (Pentachlorophenol, Technical)
NIFOS*-T (Tetraethyl Pyrophosphate, Technical. For agricultural use only.)
NIRAN* (Parathion. For agricultural use only.)

*Reg. U. S. Pat. Off.

Announcing...

C **OMPLETE** dispersion for easy mixing and superior dusting qualities

C **ONSISTENTLY** free flowing from all types of dusting equipment

C **OMPATIBLE** with all insecticides now in general use

C **OVERS** more plants and greater area than diluents of lesser density

C **ONDITIONS** insecticides, preventing packing and lumping in storage

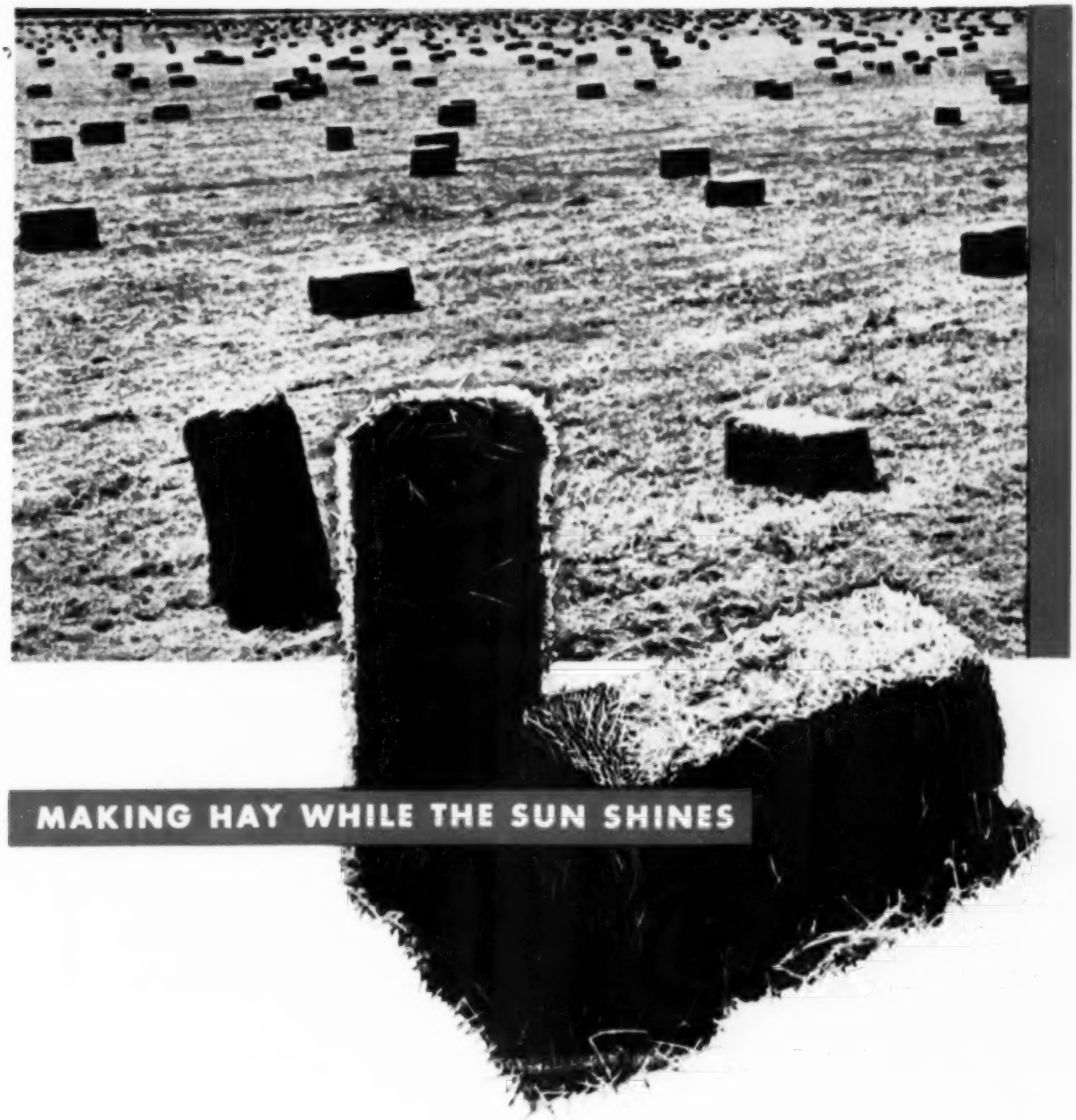
C **OATS** plants, leaves and stems with uniform toxic film

FREE TEST SAMPLE ...gladly sent on request along with detailed information and prices.

Calcium Carbonate Company

222 West Adams Street · Chicago 4, Illinois
PLANT LOCATIONS: Quincy, Illinois · Weeping Water, Nebraska · Carthage, Missouri
LABORATORIES: 520 South Fourth Street, Quincy, Illinois

SUPPLYING INDUSTRY WITH CALCIUM CARBONATE PRODUCTS FOR OVER A QUARTER OF A CENTURY



MAKING HAY WHILE THE SUN SHINES

Summer after summer this field yields a rich, heavy harvest. Feed that builds healthy, hefty livestock in the winter months. Peak production in the hayfield always puts better meat on the dinner table and bigger profits in the bank.

The secret of healthy harvests lies in the soil, ultimate source of all animal and vegetable growth. Yearly, vital plant-food elements are drained from the land to meet the demands of peak production. Fertilizers help restore these elements.

The most effective soil-replenishing fertilizers contain POTASH, often Sunshine State Potash, a product of New Mexico. Potash helps nourish the soil and strengthen crop resistance to disease and drought. Potash proves valuable in producing good crops and better business.

SUNSHINE STATE POTASH
A PRODUCT OF NEW MEXICO U.S.A.

REG. U. S. PAT. OFF.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 48/52% K_2O
MANURE SALTS 20% K_2O MIN.

UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

MATHIESON

Agricultural Chemicals

anhydrous ammonia
superphosphate
ammonium sulphate
nitrate of soda
base goods

9-gamma BHC dust base
9-15 BHC-DDT dust base
50% DDT dust base
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36-gamma technical BHC
ground and refined sulphur

high analysis pelletized fertilizers:
- Ammo-Phos-16-20-0, 13-39-0
- Ammo-Phos with potash such as 12-24-12, 13-13-13

regular grade mixed fertilizers

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Little Rock, Arkansas
St. Louis 2, Missouri
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Lebanon, Pennsylvania
Jackson, Mississippi
Phoenix, Arizona

For complete information write:

MATHIESON AGRICULTURAL CHEMICALS COMPANY
Division of MATHIESON CHEMICAL CORPORATION
P. O. BOX 991 LITTLE ROCK, ARKANSAS

Strong . . .

Strength and durability of papers and materials used in Hammond Multi-Walls, provide you with extra tough quality bags for safest, dryest packaging of your products. Correctly designed . . . produced by skilled craftsmen . . . in modern plants equipped with efficient production and material handling equipment . . . Hammond Multi-Walls will deliver your products "as packaged." Consult your Hammond man for Multi-Walls that meet every requirement of your products, and your delivery schedules.

For Multi-Wall bags, "make it a habit to depend on Hammond."

HAMMOND

Multi-Walls

HAMMOND BAG & PAPER COMPANY

General Offices: Wellsburg, W. Va.

Plants in Wellsburg, W. Va. and Pine Bluff, Ark.

Representatives in the following cities: CHICAGO, ILL. • BLUEFIELD, VA. • CHARLOTTE, N. C. KANSAS CITY, MO. • MINNEAPOLIS, MINN. • LIGONIER, PA. • WASHINGTON, D. C. NEW YORK, N. Y. • AKRON, OHIO • HOUSTON, TEXAS

Pasted Valve Type

Sewn Valve Type

Open Mouth Pasted Bottom

Open Mouth Sewn Bottom

COTTON GROWERS!

DECREASE HOE LABOR REQUIREMENTS!

CUT WEEDING COSTS!

DO A BETTER WEEDING JOB!

GET FULL BENEFIT FROM YOUR FERTILIZER!

USE CHLORO-IPC

Every cotton grower owes it to himself to utilize the remarkable powers of Chloro-IPC in controlling annual grasses and weeds in his cotton plantings.

It means maximum cotton yield and greater profit for the grower with less bother and less work.

Results of a typical field test, conducted during the first 32 days of cotton growth, disclosed that control of weeds by hoeing cost $14.70 per acre. Control with Chloro-IPC, however, reduced this cost to $3.94 per acre.

MANY OTHER ADVANTAGES ARE OFFERED BY CHLORO-IPC:

1. **It provides a wide margin of safety.**
2. **Long residual effect.**
3. **Little influence by weather fluctuation.**
4. **Low toxicity to humans and animals.**

Accurate studies from widespread grant-in-aid programs have provided Columbia-Southern with much data on Chloro-IPC and its economy. This information is available for your use. Call for a discussion with Columbia-Southern agricultural specialists today.

*Columbia-Southern pioneered in the development and field testing of Isopropyl N (3-Chlorophenyl) Carbamate, and was first to serve agriculture with this promising herbicide ingredient. Chloro-IPC is the brand name of Columbia-Southern for Isopropyl N (3-Chlorophenyl) Carbamate.

COLUMBIA-SOUTHERN
CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY

EXECUTIVE OFFICES:
FIFTH AVENUE AT BELLEFIELD, PITTSBURGH 13, PA.

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"In terms of beef and pork produced, 8-8-8 on pastures is a real investment"

—says Beryl Wayt, Michigantown, Ind.

Mr. Wayt applied 400 pounds of 8-8-8 complete fertilizer on a tract of Big English bluegrass and ladino clover in 1950, and it has been yielding excellent feed since. Without additional fertilizer, the 28-acre tract carried 65 hogs and 38 two-year-old cattle last spring. There was plenty of feed at all times and the grass was thick and rich.

Mr. Wayt says, "The last three years have convinced me that 8-8-8 fertilizer, in terms of beef and pork produced, is definitely an economical operation. I plan to refertilize the area with 8-8-8 again next spring."

Bigger yields for farmers mean better business for you

THE big yields that high-nitrogen fertilizers produce are the strongest argument in favor of their use. Farmers find they pay for themselves over and over again.

Results like this are pushing the demand for high-nitrogen complete fertilizers up and up. Meet this demand by giving high-nitrogen fertilizers a big spot in your sales program.

And for the best results, use U·S·S Ammonium Sulphate for a major part of the nitrogen content. It's a dry, free-running material that performs well in mixing as well as in distributing equipment.

For complete information on U·S·S Ammonium Sulphate, get in touch with our nearest Coal Chemical sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S AMMONIUM SULPHATE

3-447

UNITED STATES STEEL

Formulators & Dust Mixers..

Now...Get Your DDD TDE Requirements From GENERAL CHEMICAL

...the "one-stop" source for all your important Base Materials & Toxicants

With full-scale commercial production of DDD (TDE) at its Marcus Hook, Pa., plant, General Chemical has provided formulators with a reliable new source of this increasingly important organic insecticide.

Now you can obtain your DDD technical and dust base requirements from the *same* producer which has long been a major supplier of DDT, Arsenicals, BHC, Lindane, Potassium Cyanate and other base materials for agricultural insecticides, fungicides and herbicides.

For your DDD needs—or for any of the other toxicants listed here—write or phone any of General Chemical's offices located from coast to coast.

DDD (TDE)
Technical, Flake
Dust Base (50% DDD)

DDT
Technical, Flake or Granular
Dust Base, 50% & 75%

BHC
Technical (15%, 36% & 90% Gamma)
Dust Base, 12% Gamma

LINDANE
Technical
Dust Base, 25%, 75%, 95%
Emulsifiable Concentrate, 20%
Oil Concentrate 20%

ORGANIC MITICIDES
"Aramite"
Genite* 883 (p-chlorophenyl p-chlorobenzene sulfonate)
Genite 923 (2,4-Dichlorophenyl Ester Benzene Sulfonic Acid)

LEAD ARSENATE
Standard
Astringent
Basic

CALCIUM ARSENATE
Standard
Low Lime

PARATHION
Dust Base, 25% Emulsifiable, 2 & 4 lbs. per gallon

FERBAM
Dust Base (76% Ferric Dimethyl Dithiocarbamate)

ZIRAM
Dust Base (76% Zinc Dimethyl Dithiocarbamate)

2,4-D
Acid, and Technical Esters

2,4,5-T
Acid, and Technical Esters

TCA · SODIUM SALT
90% Dry Powder
50% Liquid Concentrate

POTASSIUM CYANATE
Technical
Cotton Defoliant
Weed Killer

DINITRO
Pre-Emergence Herbicides

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Agricultural Chemical Department

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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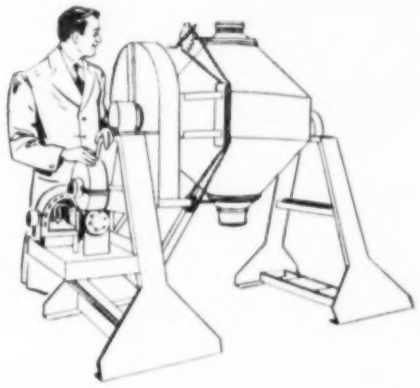
MORE PESTICIDE SALES

Ease of handling, increased output, lowered cost, and an improved final product are the common experience of those who adopt DILUEX as the carrier and diluent in their pesticide formulations. Customer satisfaction and growing sales naturally follow. This is borne out very definitely in the records of recent years.



Ask for more data and Samples!

For impregnating liquid toxicants—milling DDT, BHC, or other organics—conditioning blended dusts—the total demand for DILUEX has multiplied during these years. Production facilities have been greatly enlarged to keep pace. Inquiries and orders will be given prompt attention.

FLORIDIN COMPANY

ADSORBENTS . . . DESICCANTS . . . DILUENTS

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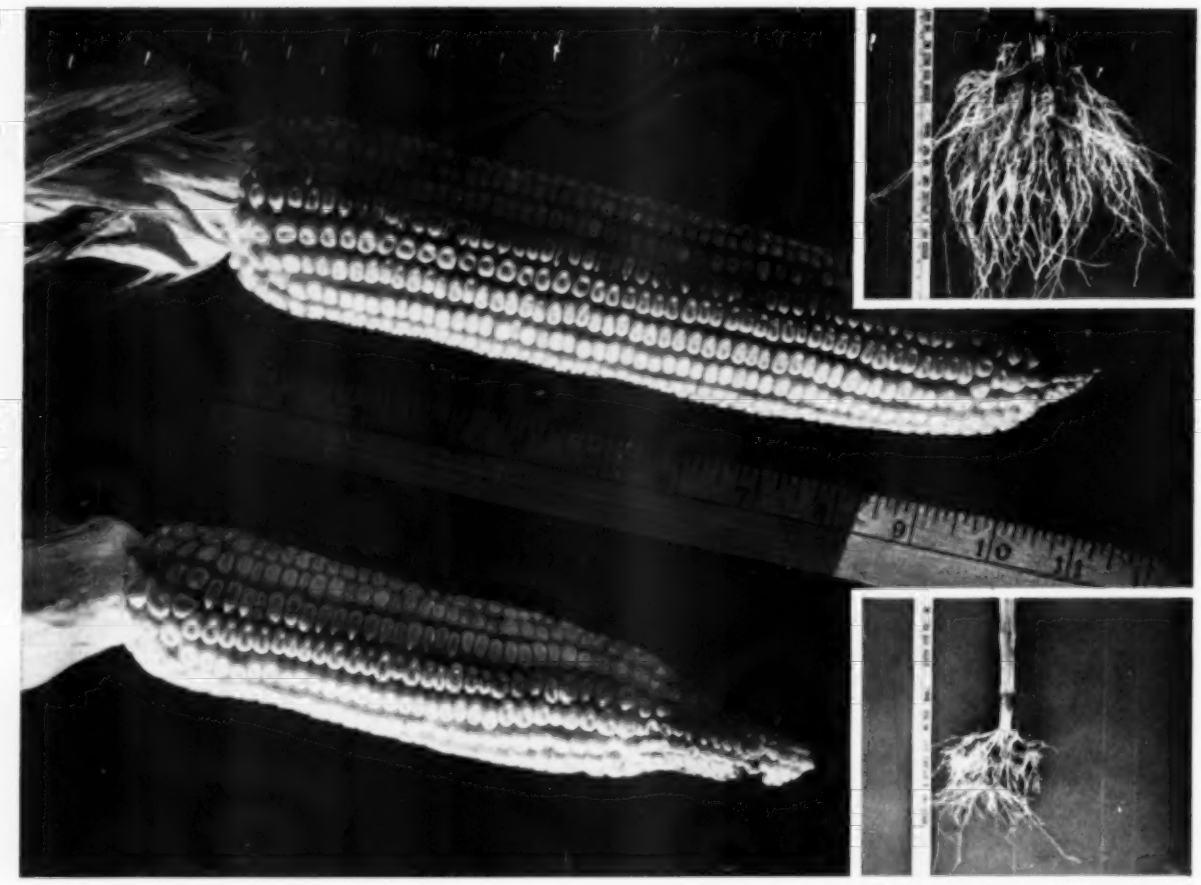

aldrin-treated corn (*top*), untreated corn (*bottom*) from adjacent rows, clearly shows how treatment of the soil with aldrin promotes healthy roots, improves quality, increases yield.

1953 will be a BIG YEAR for aldrin on corn

Will you be ready to meet the demand?

Many growers tried aldrin last season to fight the corn rootworm. Some went "whole hog" and were glad they did. Others treated just a small part of their acreage. We've yet to hear of a single user who isn't satisfied that aldrin is the answer to the corn rootworm problem.

HERE'S WHAT ALDRIN DOES FOR CORN:

1. **More bushels per acre of higher quality corn.**
2. **Low-cost-per-acre control.**
3. **Less lodging . . . easier picking.**
4. **A healthy early stand . . . no replanting.**

HOW YOU SELL ALDRIN:

- **Mix it with fertilizer and sell the mixture for simultaneous application.**
- **Sell the aldrin formulation alone, for application as a dust or spray, directly on the ground before planting.**

Aldrin was extensively advertised as a corn rootworm control last year . . . will get even heavier support this year. So be sure you have enough aldrin. Technical literature is available.

Julius Hyman & Company Division

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INDUSTRY *News*

Pennsalt Names Siddall

CAMERON SIDDALL

The Pennsylvania Salt Manufacturing Company of Washington has named Cameron Siddall sales manager of the Agricultural Chemicals Department for the eleven western states, it was announced recently by F. G. Shanaman, president of the company. Mr. Siddall will make his headquarters at the company's Tacoma, Washington, office where, prior to assuming his present duties, he was assistant to the president.

Before coming to Tacoma, Mr. Siddall was located at Pennsalt's district office in Berkeley, California, as assistant sales manager of the chemicals department; previous to this, he was manager of Pennsalt of Washington's Southwestern Division in Bryan, Texas.

A graduate of Texas A and M College, Mr. Siddall was formerly state entomologist for the Texas Extension Service and joined the Pennsalt organization in 1946.

•

Pacific Branch to Tahoe

Plans are under way for the 1953 meeting of the Pacific Branch, American Entomological Society (American Association of Economic Entomologists) scheduled to be held at Lake Tahoe on June 23, 24 and 25. Charles H. Starker, Pacific Supply Cooperative, Portland, Oregon, indicates that program details will be available for publication shortly.

•

New Simplot Division

J. R. Simplot Company, Pocatello, Idaho, has announced that the Simplot Fertilizer Company, with mining and production operations at Pocatello, is now known as the Fertilizer Division of J. R. Simplot Company.

The firm also announced the appointment of E. W. Hansen as sales manager of its fertilizer, fluorspar and barite divisions, with offices at 212 Continental Bank Building, Boise, Idaho.

L. M. Buhler has been made manager of fertilizer production and phosphate mining. His office will be in Pocatello.

•

New S. A. Office for Edco

Edco Corporation has announced tentative plans for the establishment of a Brazilian office in Sao Paulo, Brazil, for distribution in that country of DDT, lindane, BHC, parathion, dieldrin, aldrin, toxaphene and tetraethylpyrophosphate. Edward Dobbin, head of the company, said that a new addition to the firm's line of chemicals will be methyl bromide for soil fumigation. All of these products will be distributed throughout Brazil from the Sao Paulo headquarters, according to Mr. Dobbin.

Reichard Joins Stauffer

DIRCK REICHARD

Dirck Reichard has been appointed administrative assistant to John H. Kennedy, assistant sales manager in charge of agricultural sales for Stauffer Chemical company in the east.

Mr. Reichard served in the Navy during World War II and was graduated from Michigan State College in 1947. He then joined the export department of the Michigan Chemical Corporation in St. Louis, Michigan. In 1948, he was transferred to the New York Office and handled both export and domestic sales of their agricultural and industrial chemicals. Early in 1950, he joined Shell Chemical Corporation as agricultural chemicals representative in their New York and eastern seaboard district.

•

Dr. R. C. Back Joins Ethyl

Dr. Richard C. Back has been appointed to the product development staff of Ethyl Corporation, New York. Dr. Back, an entomologist, will serve under Dr. Charles L. Smith, associate director of product development in charge of agricultural chemicals, and will assist in the research and develop-

ment of agricultural chemicals, including their field evaluation.

For the last year and a half, Dr. Back has been in charge of the insecticide phase of an Ethyl-sponsored research project at the Boyce Thompson Institute for Plant Research in Yonkers, N. Y. A major purpose of the project is to screen present and potential useful agricultural chemicals, in cooperation with Ethyl's research laboratories in Detroit, and to investigate new formulations and applications. To date, several hundred insecticides, herbicides and fungicides have been studied by the project.

•

Cyanamid Plants Honored

American Cyanamid Company has announced that two of its plants won high honors in the recent fire prevention week contest sponsored by the National Fire Protection Association.

The Welland Plant, operated by North American Cyanamid Limited at Welland, Ontario, placed first among all industrial plants in Canada and fourth among all entries in the United States, Canada and Alaska.

The Azusa Plant at Azusa, California took eighth place among industrial plants in these areas.

Both plants also received high honors during last year's competition.

To receive high honors in the national fire prevention week contest a company must carry on a comprehensive fire prevention program throughout the year with particular emphasis on fire prevention techniques during fire prevention week.

•

Japan to Supply Nitrogen

Nitrogen requirements for Korea and Formosa, supplied in recent years largely from the United States, will be obtained in Japan this year. Purchase of 220,000 tons of ammonium sulfate in Japan has been completed for shipment to Korea, it is reported. This tonnage is to be delivered over a four-month period.

According to information received in the U. S., the purchase was made by the Army and is expected to place somewhat of a strain on some Japanese producers.

Spencer Ups Powell

Richard G. Powell, a technical service representative for Spencer Chemical Company, has been transferred to the Spencer North-Central office in Chicago to act as technical service representative for the North-Central district.

Mr. Powell had been in the Spencer executive and general sales offices in Kansas City. He became associated with the company in January, 1952.

A graduate of Iowa State college in

RICHARD G. POWELL

1951, Mr. Powell received a B.S. degree in Chemical Engineering. He was a member of the student organization of the American Institute of Chemical Engineering and was president of Alpha Tau Omega social fraternity in college. He is also a member of the American Chemical Society.

•

Western Conference Held

The twenty-seventh annual meeting of the Western Cooperative Spray Project was held at the Imperial Hotel, Portland, Oregon on January 21, 22 and 23, 1953. The conference membership is composed of State, Federal and Dominion entomologists, pathologists and chemists engaged in research or extension work on the control of fruit insects and diseases in California, Colorado, Utah, Idaho, Montana, Oregon, Washington, British Columbia and Alberta.

H. S. Telford was chairman and L. G. Gentner secretary of the conference. January 21 and 22 were closed sessions but January 23 was open to members of industry. Discussion leaders included: V. W. Olney, for insects attacking apples and pears; Ted Anthon, pests of stone fruits; J. R. Kienholz, fruit diseases; D. B. Waddell, spray dispersal equipment and L. C. Terriere, spray residues.

W. T. Sumerford of the Wenatchee Laboratory of the Public Health Service gave an illustrated talk on economic poisons and the work of the laboratory in safeguarding human health.

The discussion leaders presented summaries of the 1952 research work to members of industry at a luncheon session held January 23.

Members elected to office for the coming year were: H. S. Telford, chairman, M. R. Harris, co-chairman; V. W. Olney, secretary; and J. R. Kienholz, co-secretary.

The 1954 meeting will be held on January 20, 21 and 22 at the Imperial Hotel, Portland, Oregon, Mr. Olney stated.

•

Wisc. Meeting Held

A program geared to the needs of lime and fertilizer dealers and salesmen was held February 2 at the University of Wisconsin, Madison. Arranged by the Soils Department, the meeting featured papers by University of Wisconsin specialists.

E. J. Graul was chairman of the session. Dr. Emil Truog spoke on "Doubling Crop Yields with Lime and Fertilizer"; A. E. Peterson, on "Results with Sure-Fire Soil Preparation for Alfalfa"; and C. J. Chapman on "Pasture and Hay Fertilization."

The afternoon session was under the chairmanship of O. J. Attoe, with the subject of corn production under consideration. Speakers included L. E. Engelbert; K. C. Berger, G. M. Briggs, W. B. Griem, and Dr. Truog.

•

New CSC Plant

Commercial Solvents Corporation, producer of methanol, ammonia and nitrogen fertilizers, has awarded a contract to the Luria Engineering Company for a 16,000-square-foot plant to be erected in Sterlington, Louisiana.

The one-story building, scheduled for completion in March, will be used for the manufacture of ammonium nitrate.

It will have a standardized steel frame produced at Luria's fabri-

cating plant in Bethlehem, Pa. The frame will have a corrugated aluminum cover.

The structure will be 200 feet long and have a clear span of 80 feet to provide maximum, column-free floor space for storage and handling.

•

Dr. Wilson to Connecticut

Announcement has been made of the appointment of Dr. David G. Wilson to the staff of the Biochemistry Department of The Connecticut Agricultural Experiment Station, New Haven. The appointment was made possible by a grant recently made by the National Science Foundation to enable the Station to broaden its basic research on the metabolism of leaves.

Dr. Wilson comes to the Station from the University of Wisconsin, where he recently received a doctorate degree in biochemistry and plant physiology. His undergraduate work was done at the University of Toronto, and he received his M. S. degree from Queens University, Kingston, Ontario, Canada. While at Queens University, he received the Medal in Biochemistry awarded by that institution.

Dr. Wilson's past work has been concerened with the nitrogenous compounds and organic acids of plants. He has also had experience in the use of radioactive isotopes. His first project at the Station will be a study of the function of isocitric acid in the leaves of succulent plants.

•

Reduces 2,4,5-T Price

Thompson Chemicals Corporation, St. Louis, Mo., basic manufacturer of brush and weed killers, has announced new, lower rate structures on its line of "Bramble-Weedicide" and "Brambleide."

Announcing the lowered rates, Wm. T. Thompson head of the firm, announced that "new and more efficient manufacturing methods plus far larger production make possible new economies in the production of 2,4-D and 2,4,5-T."

In addition to lower prices, better application techniques and the use of more powerful esters are providing inceased kills which also lower material costs of chemical brush control.

•

Vernon Named Vice-Pres.

Food Machinery and Chemical Corporation has elected Jackson

JACKSON V. VERNON

V. Vernon a vice-president of the corporation. The promotion was made at a directors' meeting at FMC headquarters on February 6.

Mr. Vernon is head of FMC's Niagara Chemical Division, a nation-wide producer of agricultural insecticides and fungicides. He has been associated with the division since 1923 and, prior to his present position was sales manager of the operation. Late in 1952, Mr. Vernon was placed in charge of Niagara Chemical, succeeding Ernest Hart who became executive vice president of FMC in charge of chemical divisions.

FMC's Niagara Chemical Division with headquarters at Middleport, New York, is a leader in the production of insecticides and fungicides used in agricultural areas throughout the country. The division's manufacturing operations include 14 plants located in 11 states, Canada, and Mexico.

•

Weller Noble to Retire

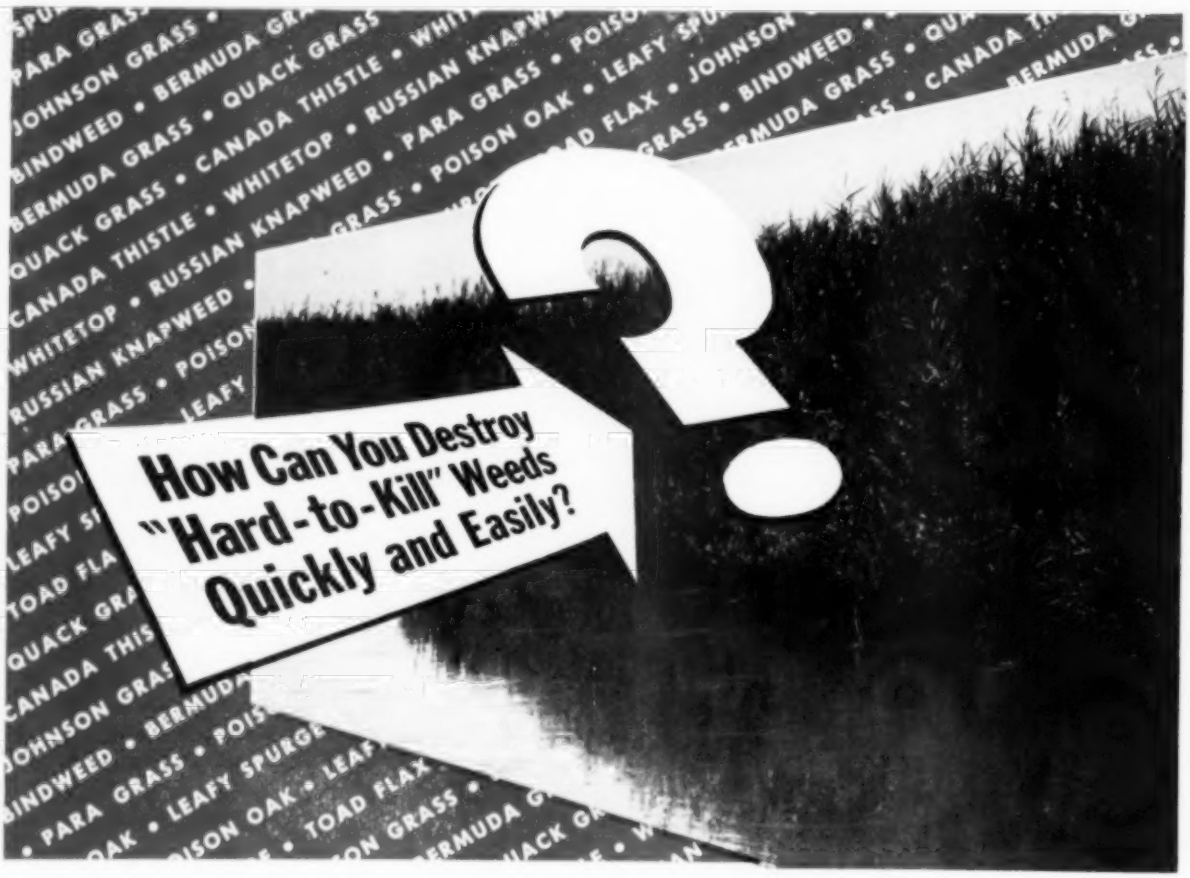
Weller Noble has announced that he will retire as president and general manager of Pacific Guano Co., Berkeley, Calif., on April 1. He will be succeeded by W. G. Hewitt, vice-president of the parent company, Pacific Chemical and Fertilizer Co. of Honolulu .

Well known in agricultural circles throughout the country, Mr. Noble has served Pacific Guano and its predecessor companies for a total of 45 years. He became vice-president in 1935 and held this position for ten years, being named president in 1945.

Prominent in the affairs of the California Fertilizer Association of which he is a charter member and past president, Mr. Noble has also played a prominent role in the National Fertilizer Association. He served as a director for many years and was chairman of the board from 1946 to 1948.

New Building for Bemis in Memphis, Tenn.

Architect's drawing of new building under construction to be occupied by Bemis Bro. Bag Co. under long-term lease. It is located in a modern industrial subdivision in Memphis, Tennessee. Owner is Union Realty Company. Design of the 120,000 square foot building is the result of study by Bemis engineers and the owners. Efficient operation and employee comfort are stressed in the one-story, steel, concrete and brick building. An 8,000 square foot office will be air conditioned and will have the latest type of lighting, acoustical and decorative treatment. The building should be ready for occupancy in April, 1953, Bemis has announced.



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HIGHLY SOLUBLE

Polybor-Chlorate®

WEED KILLER

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★ NONFLAMMABLE
★ NONSELECTIVE
★ ECONOMICAL
★ CONVENIENT

POLYBOR-CHLORATE destroys *all* vegetation quickly and easily when applied properly! With POLYBOR-CHLORATE you get the combined effectiveness of borates and sodium chlorate . . . Spray applications result in fast killing action by contact *plus a residual effect* for complete destruction through root-action. This powerful general purpose weed and grass killer is especially useful for the quick destruction of tall standing vegetation where mowing or scalping is neither feasible nor desirable.

Write for literature and name of nearest dealer or distributor now!

PACIFIC COAST BORAX CO.
DIVISION OF BORAX CONSOLIDATED, LIMITED
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So. Safety Meeting On

The Fertilizer Section of the National Safety Council was holding its Southern Conference at the Atlanta Biltmore Hotel, Atlanta, Ga., as this issue went to press. Scheduled for Monday and Tuesday, March 2 & 3, the session was to feature a panel discussion on safety and a number of prepared papers on various phases of safety in fertilizer plants.

V. S. Gornto, Smith-Douglass Co., Norfolk, Va., vice-chairman of the Section, was to act as chairman of the two-day sessions, according to the advance program. An informal conference on fertilizer plant safety under the chairmanship of A. B. Pettit, Davison Chemical Corp., Baltimore, was on the agenda for Monday afternoon. Appearing on the panel were the following: G. F. Dietz, safety director, Fertilizer Manufacturing Cooperative, Inc., Baltimore; F. Wayne High, manager of operations, Baugh Chemical Co., Baltimore; C. A. Cox, assistant manager, manufacturing department, Virginia-Carolina Chemical Co., Richmond, Va.; and E. F. Carnell, superintendent, Davison Chemical Co., Savannah, Ga. Members of the panel were to discuss questions submitted in advance by the fertilizer industry and also to answer questions from the floor at the meeting.

Four papers were to be presented and a general discussion to be held at the session of the final day of the meeting. O. R. Kiphart, safety supervisor, Phillips Chemical Co., Borger, Texas, was to talk on "The Maintenance Foreman's Responsibility"; Walter Zielenske, fire prevention engineer, Marsh & McLennan, Chicago, on "The Importance of Fire Prevention"; E. O. Burroughs, Jr., manager, Insurance Department of F. S. Royster Guano Co., Norfolk, Va., "Housekeeping in Fertilizer Manufacturing Plants"; and A. C. Thornton, industrial relations manager, International Minerals & Chemical Corp., Chicago, Ill., "Before and After."

The meeting was to end with a general discussion based on the preceding papers or other questions regarding the subject of fertilizer plant safety.

Oostermeyer to Retire; McCurdy to Head Shell

JAN OOSTERMEYER

R. C. McCURDY

JAN OOSTERMEYER, president of Shell Chemical Corporation, has announced his intention to retire May 31 after 36 years of service with various Shell companies. He will be succeeded by R. C. McCurdy, now general manager of the Royal Dutch Shell companies in Venezuela. •

Mr. Oostermeyer's career, embracing a wide variety of positions in many parts of the world, included more than 20 years in China. In 1939, he became assistant to the president of Shell Chemical, since 1929 a pioneer in the petrochemical field. In 1941 he became vice-president, and in 1942, president. He will remain in an advisory capacity with the company until the end of the year.

Acquires B. C. Betner Co.

Continental Can Company, New York has acquired the assets and business of the Benjamin C. Betner Company of Devon, Pa., in exchange for 73,177 shares of common stock, it was announced Feb. 2 by General Lucius D. Clay, chairman of the board of Continental.

The Betner company manufactures small and medium-size bags from various materials including paper, foils, cellophane, laminates, glassine, plastics and wax paper. In addition to the plant at Devon, the company operates plants at Richmond, Va.; Paris, Tex.; Beaumont, Tex., and Los Angeles, Calif.

It also has two wholly-owned operating subsidiaries: Benjamin C. Betner Company of California and Thomas M. Royal & Co. It has 50 per cent stock ownership in the Benjamin C. Betner Co. of Wisconsin.

"Continental will operate this business as a separate division and as a supplement to the company's Fibre Drum and Paper Container divisions," General Clay said.

Betner is a large producer of bags used widely in the fertilizer field and for packaging of other chemical materials. Last year's sales totaled about $13,000,000.

•

Named Research Head

F. W. Kavanagh has been appointed manager of Petroleum Products Research, Development and Technical Services Divisions at the Richmond Laboratories of California Research Corporation, the firm has announced. He succeeds A. H. Batchelder, who was recently elected a vice-president of this Standard Oil Company of California subsidiary.

Your customers could control insects like this . . .

but the surest way is with easy-to-handle

Pittsburgh

PARATHION 25 WM

Pittsburgh Parathion 25 WM is one of the best selling of all Parathion formulations. It forms an emulsion in water and is easier to handle, mix and apply than any other form. This one, *easy-to-use* insecticide will effectively control over 20 major pests, including aphid . . . greenbug . . . leaf roller . . . leaf hopper . . . armyworm . . . European red mite and European corn borer.

And don't forget! Pittsburgh Parathion 25 WM is *Quality-Controlled* from coal to finished chemical because Pittsburgh is basic. ● Write today for additional sales or technical information.

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ORGANIC INSECTICIDES: Benzene Hexachloride, Toxaphene, DDT, Aldrin, Dieldrin, Chlordane.
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WEED KILLERS: 2,4-D Acid, 2,4-D Amine Concentrates, 2,4-D Ester Formulated Concentrates, 2,4-D Sodium Salt Monohydrate, D4 (Low Volatile 2,4-D Ester), C4 Pre-Emergence Weed Killer, 2,4,5-T Formulations.
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Diamond Announces New Appointments

H. E. MEADOWS

ALBERT F. FUCHS

L. J. POLITE

FOUR appointments by Kolker Chemical Works, Inc., subsidiary of Diamond Alkali Company, have been announced by J. G. Brunton, vice-president in charge of sales.

Dr. L. Gordon Utter, formerly plant pathologist for Phelps-Dodge Refining Corp. has been placed in charge of all technical service work involving the company's expanding line of organic agricultural chemicals, with headquarters at Newark, N. J. Dr. Utter, with degrees from Syracuse University and Columbia University is well acquainted with industry problems through his activities as chairman of the National Agricultural Chemicals Association technical advisory committee.

Albert F. Fuchs, formerly manager Insecticide Division, Naco Fertilizer Company, Charleston, South Carolina, has been appointed assistant sales manager. Mr. Fuchs, well known in the cotton south in the field of agricultural chemicals is a graduate of the College of Charleston. He also will make his headquarters in Newark, N. J. handling the sales of DDT, BHC, lindane and herbicides in the southern territory.

H. E. Meadows, formerly with Forest Chemical Products Company, Hattiesburg, Mississippi, has been appointed Southwestern technical sales representative with headquarters at Diamond's Houston, Texas office. Mr. Meadows is a graduate of Southwestern Louisiana Institute and did graduate work in entomology at Ohio State University. He will devote the majority of his time to furthering the sales of Diamond's brush killers, herbicides, and cotton pesticides in the Southwestern area.

To expand the sales of Diamond's organic chemicals in the North Central States, Mr. Charles L. Troph has been transferred from the Industrial Chemical Department of the Chicago office. Mr. Troph, a graduate of Ohio State University in chemistry, will continue to headquarter in Chicago.

L. J. Polite, Jr. of the Newark office has also been made an assistant sales manager and will devote his time to sales activities in the northern territory. Mr. Polite joined the division a year ago, coming from Diamond's Solvent Sales Department.

Dr. L. GORDON UTTER

•

Thurston Names Three

Thurston Chemical Co., Joplin, Mo., has announced recent appointments in the firm. According to John W. Ground, vice-president, O. M. Walstad has been made plant manager of the Atlas, Missouri, plant. Mr. Walstad will be responsible for management of all sections at the Atlas plant, including the newly-created chemical section. He was formerly production superintendent for all company plants.

James A. Doyle will serve as superintendent of the chemical section at the Atlas plant. He is a chemical engineer and was previously associated with Mathieson Chemical Co.

Bert W. Crow will be assistant superintendent for the chemical section at Atlas. He was formerly with Standard Oil Co.

One-Stop
Nitrogen
Service . . .
for fertilizer
manufacturers

LION Nitrogen

FERTILIZER MATERIALS

LION ANHYDROUS AMMONIA—For formulation. A uniformly high-quality basic product. Nitrogen content, 82.25%.

LION AQUA AMMONIA—For formulation or acid oxidation. Ammonia content about 30%. Other grades to suit you.

LION AMMONIUM NITRATE FERTILIZER—For direct application or formulation. Improved spherical pellets. Guaranteed 33.5% nitrogen.

LION NITROGEN FERTILIZER SOLUTIONS—For formulation. Three types to suit varying weather and manufacturing conditions.

LION SULPHATE OF AMMONIA—For direct application or formulation. Large free-flowing crystals. Guaranteed nitrogen content, 21%.

TECHNICAL SERVICE—Lion provides special technical assistance for fertilizer manufacturers. Write to CHEMICAL SALES DIVISION for quick service.

LION OIL COMPANY
EL DORADO, ARKANSAS

B. F. Goodrich Chemical Appoints Three

GEO. B. KOCH J. S. WOLFF M. W. OSBORNE, JR.

M. W. OSBORNE, JR., has been named international sales manager, George B. Koch has been appointed advertising manager, and J. S. Wolff agricultural chemical staff representative in a series of promotional moves at B. F. Goodrich Chemical Company, recently announced by J. C. Richards, Jr., vice-president, sales.

Mr. Osborne, formerly advertising manager, has taken over the international sales position recently vacated by O. E. Isenburg, who has been made sales manager of Harmon Colors.

Graduated from Illinois College in 1943 with an A.B. in Chemistry, Mr. Osborne served three years in the Navy as a Lieutenant before obtaining his M.B.A. in marketing and production from Harvard Business School. He then joined Goodrich Chemical in 1947 as a sales correspondent and in 1949 entered the advertising department, working on sales promotion. He was made advertising manager in 1950.

Mr. Koch, moving from the post of agricultural chemical staff representative, is well known in advertising circles. He served as BFG Chemical advertising manager from 1948-50, joining the general chemicals department in 1950 to help organize the agricultural chemicals sales branch and to handle the contact work necessary to market several new products. Koch's position as advertising manager now includes the supervision of all publicity, sales promotion, technical data, and advertising.

Mr. Koch was graduated from Western Reserve in 1940 with a B.A. and served four years in Air Corps public relations before joining the Chemical Company as a sales promotion man in 1946.

Mr. Wolff, former Goodrich Chemical Washington representative, will shift into the agricultural chemical staff representative position, relocating in Cleveland.

After receiving his B.S. in Chemical Engineering from Carnegie Institute of Technology in 1940, Mr. Wolff served in the Chemical Warfare Service for five years before coming with the company in 1946 as a development engineer. He joined the sales department in 1947, and in 1951 was made the company's representative in Washington, D. C.

•

Dr. Shaw, Mich. State, Dies

Dr. Robert S. Shaw, 81, president emeritus of Michigan State College, East Lansing, died February 7 following a heart attack. Before becoming president of Michigan State, Dr. Shaw was dean of agriculture and director of the college experiment station since 1908. He is credited with having purchased a thousand acres of land surrounding the school, which later became an important factor in the institution's development.

Dr. Shaw was president from 1928 until his retirement in 1941, at which time he was succeeded by his son-in-law, Dr. John A. Hannah. The latter is now on leave from the college as Assistant Secretary of Defense in charge of manpower, in Washington, D. C.

•

300 at Conn. Meeting

Some 300 vegetable growers, setting a record attendance at the mid-winter vegetable meeting, gathered at The Connecticut Agricultural Experiment Station at New Haven, February 5 for this annual all-day session.

Latest developments in chemical weed control were discussed by Dr. R. D. Sweet, researcher in this field at Cornell University. Along with specific suggestions for using weed killers on various crops during the coming season, Dr. Sweet said that the day of hand weeding was fast coming to an end and prophesied that chemical weed controls would soon take over the entire job.

A popular feature of the meeting was a pest control clinic, to which growers brought their vegetable insect problems. Questions from the floor continued well after the scheduled closing hour of the meeting. The panel was chairmanned by E. C. Minnum, vegetable specialist at the University of Connecticut, and included Dr. Saul Rich, Dr. B. F. Lownsbery and Dr. Gordon Taylor, plant pathologists, and Dr. J. B. Kring, Dr. R. L. Beard, and J. P. Johnson, entomologists, all of the Connecticut Station staff.

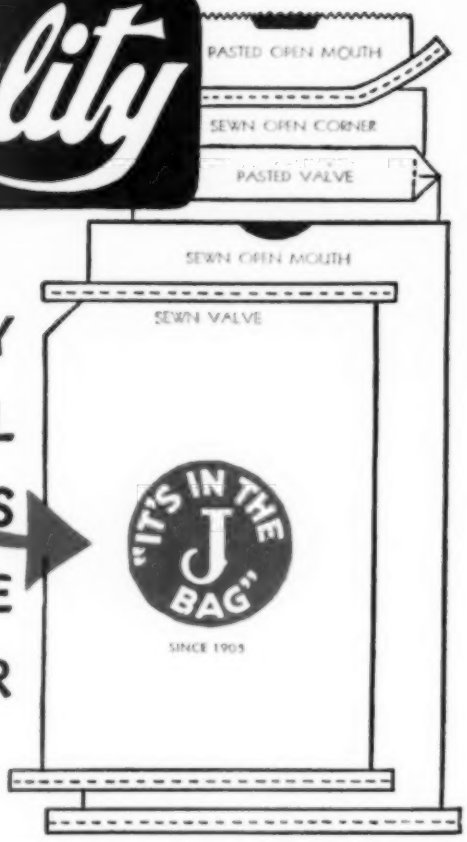
•

Liquid Fertilizer for Ala.

The A. A. Liquid Fertilizer Company has been organized at Troy, Alabama, to supply anhydrous ammonia to farmers throughout its section of the state. The new firm will make application with its own equipment, it is understood. This type of operation is new to this area.

Stockholders in the new firm, which was to be incorporated in February, include H. R. Theriott, R. B. Blumentritt, W. F. Joiner and T. W. James.

Jaite Quality



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Powers New Chemical Construction Head

GEN. WM. N. PORTER

E. D. POWERS

ELECTION of E. D. Powers as president of Chemical Construction Corp. was announced February 16. He will remain as vice-president and director of the parent firm, American Cyanamid Company.

Major General William N. Porter, who had been president of Chemical Construction Corporation since 1947, was elected chairman of the board of directors.

Mr. Powers, who has also been elected a director and member of the executive committee of Chemical Construction Corporation, has been with Cyanamid since 1918 where he has served in numerous capacities with several divisions. He was elected vice-president in 1950. He is also a vice-president of North American Cyanamid Limited and Arizona Chemical Company.

General Porter became a major general of the U. S. Army in 1941. He was chief of the Chemical Warfare Service from 1941 to 1945 when he retired to become associated with American Cyanamid Company. He is a director of Ultrasonic Corporation and of Chemical Construction (Inter-American) Ltd.

Chemical Construction Corporation designs and builds chemical plants throughout the world utilizing processes which it has developed or to which it own rights. During General Porter's seven years' presidency of the firm, its staff has tripled in size and the company has developed a number of new processes among which are several for the extraction of metals from ores; sulphur from surface deposits; a simplified sulphuric acid process; a urea process; a nitro-phosphate process utilizing nitric instead of sulphuric acid; and has exploited several important new processes in the petro-chemical field.

•

Hobbie Heads Corona Div.

A. C. Hobbie has just been appointed manager of the Corona Chemical Division of Pittsburgh Plate Glass Company. He was formerly manager of Corona's micronized products department at Moorestown, N. J. He succeeds Walter W. Ethier, Jr., who has been named assistant divisional director at Newark, N. J.

•

CMRA in Baltimore Meet

The Chemical Market Research Association was holding its agricultural chemicals meeting at the Lord Baltimore Hotel, Baltimore, Md. as this issue went to press. Scheduled for February 25 and 26, the meeting was to hear Harold H. Shepard, U.S.D.A., discuss "Trends in the Production and Consumption of Pesticidal Chemicals"; W. C. Dutton, Dow Chemical Co., Midland, Mich., "What's New and What's Needed in Agricultural Chemicals"; and Richard M. Lawrence, Monsanto Chemical Co., St. Louis, Mo., "Mapping the Markets for Soil Conditioners."

Wm. N. Watmough, Jr., vice-president, Davison Chemical Corp., Baltimore, was to talk on "The Present Consumption of Plant Food Materials in the U. S."; and S. L. Nevins, vice-president, Mathieson Chemical Corp., Baltimore, was to speak on "What's New and What's Needed in Agriculture."

Speaker at a dinner program was to be Lynn D. Poole, director of public relations, Johns Hopkins University, Baltimore, on "Behind the Scenes with the Johns Hopkins Science Review."

•

Joins Pioneer Chemical

Paul H. Von Wyl, a native of Denver and a chemistry graduate of the University of Colorado, has joined Pioneer Chemical Associates and will make his headquarters at the firm's executive offices in Denver. Mr. Von Wyl recently completed two year's service in the Army's laboratories, seven months of which were spent in Korea.

Pioneer Chemical markets technical materials and concentrates to the formulators of insecticides, weed and brush killers, and other agricultural chemicals. Mr. Von Wyl will participate in the technical service and sales activities of the Denver company.

•

Nixon to A-W, Atlanta

C. Thomas Nixon has been placed in charge of Industrial Chemicals Division of the Ashcraft-Wilkinson Company, the firm has announced.

Mr. Nixon is a native of Atlanta, Georgia, received his degree in Chemical Engineering from Georgia Tech; served from 1943 to 1946 with the armed forces in Europe; and has recently completed another period of active duty in the service.

Before joining the Ashcraft-Wilkinson Company, Mr. Nixon was employed by E. I. du Pont de Nemours & Company at Martinsville, Virginia.

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Poulsen Appoints Klein

HUGO KLEIN

Appointment of Hugo Klein as general sales manager of the A. E. Poulsen Co., Los Angeles, engineers and manufacturers of materials processing and handling equipment, has been announced by C. A. Turney, vice-president and general manager. The new appointee holds engineering degrees from Columbia University, and brings to his new position 24 years of widely diversified administrative and consulting experience in industry.

•

Package Luncheon Apr. 20

In connection with the National Packaging Exposition in Chicago, Ill., the annual spring luncheon meeting of the Packaging Institute will be held April 20, according to Robert de S. Couch, General Foods Corp., P. I. president. Tickets are available from the Packaging Institute, 342 Madison Ave., New York 17, N. Y. at $3.75 each. Ticket sales are somewhat limited, it was noted, because of the relatively small space available for the luncheon.

•

Lee Ashcraft Dies at 82

Lee Ashcraft, co-founder of Ashcraft-Wilkinson Co., Atlanta, Ga., died there January 26, only a few days after his 82nd birthday. With the late Mel Wilkinson, he had formed the fertilizer company now well-known to the trade both in the U. S. and abroad.

Mr. Ashcraft was a native of Alabama and came to Atlanta in 1909, soon after which he entered business. He was active in affairs of the National Fertilizer Association and frequently acted as host to the group at its fall meetings in Atlanta, by inviting the conventioneers to barbecues.

The Atlanta *Constitution*, in commenting upon Mr. Ashcraft's career, said that "he served beyond the boundaries of his own land to help France rebuild its potash mines and was publicly honored by that country.

"Outside his vocation, Lee Ashcraft found ample time for community service; in bringing international speakers to Atlanta, in the Chamber of Commerce and in promotion of agricultural fairs, in his church and especially in helping deserving young men to get a college education."

•

New S Dome to Open

Freeport Sulphur Company has announced plans for the development of a new sulphur mine at a salt dome deposit in the Louisiana marshland. The dome, known as Chacahoula, is located in Lafourche Parish.

DDT Trouble in Indonesia—Requests Advice

TO get further information from the American insecticide trade, Donald R. Johnson, entomologist with the Technical Cooperation Administration at Djakarta, Indonesia, has written AGRICULTURAL CHEMICALS the following letter regarding the physical condition of DDT used in that country.

Mr. Johnson asked if his question might be referred to the trade hoping that he might have the benefit of a number of viewpoints in deciding the correct answer. Replies should be sent to him at this address:

Donald R. Johnson.
Entomologist.
T. C. A. in Djakarta. Indonesia
Department of State Mailroom
Washington 25. D. C.

His letter is as follows:

"A rather important problem has come up in Indonesia regarding DDT wettable powders, and I am certain it must be pertinent in other tropical countries as well. Some of the DDT 75% wettable powders imported here from the United States have been in excellent condition when received but after dry storage (under reasonably good conditions for tropical areas) the suspensibility properties have become very poor. Wettable powders that once would remain in suspension for long periods of time, agglomerated and gave the appearance of curdled milk when added to water. When used in the compression hand sprayers here (without mechanical agitators) extremely unsatisfactory results were obtained. The deteriorated wettable powders settled almost immediately to the bottom of the sprayer and the surfaces sprayed during the first few minutes received an excessive dosage of DDT, whereas during the remaining spraying time almost no DDT remained in the mixture.

"This has in some instances caused malaria control campaigns to fail completely because the trouble was not detected by persons directly in charge of the spraying operations. The addition of a wetting agent such as sodium lauryl sulfate usually improved the suspensibility of these agglomerating wettable powders but this means added expense and additional nuisance, plus the fact that suitable wetting agents usually are not available in remote areas where the wettable powders are used.

"In order to solve the problem, it has been suggested that only DDT 50% wettable powders be imported into Indonesia. The persons and organizations who made this suggestion said that 50% wettable powders will retain better suspensibility properties than the 75% products when both are stored in tropical areas under similar conditions.

"This is a serious problem to officials in tropical areas who are involved in spraying campaigns where wettable powders must be used. The 75% materials are preferable because of their higher concentration of DDT, but if the 50% wettable powders will *actually* retain their suspensibility after long periods of storage, it will be necessary to import only 50% products in the future."

Stable dispersions of DDT, BHC, Sulfur . . . in fact any insecticide formulated as a wettable powder . . . are easily obtained by the addition of one to two percent Marasperse. With Marasperse added, spray tank contents are maintained at a uniform concentration. Insecticides are uniformly applied for maximum effectiveness throughout the spraying period.

Because it is a non-hygroscopic and free-flowing powder, Marasperse facilitates grinding and blending operations. It can be stored indefinitely without caking or deteriorating.

The powerful dispersing action of Marasperse is unaffected by the hardest waters. Marasperse enhances the action of wetting agents and permits the use of reduced amounts of these high cost components in formulations. A neutral compound, Marasperse will not affect toxicity of the insecticide.

Write for samples and file number 627 for additional information on Marasperse. Our technical staff will welcome the opportunity to cooperate with you.

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Naco Names Rohrer

Naco Fertilizer Co., wholly-owned subsidiary of W. R. Grace & Co., has appointed William Rohrer as manager of the Insecticide Division, to succeed Albert F. Fuchs who recently joined Diamond Alkali Co., Newark, N. J.

Mr. Rohrer will make his headquarters in New York City, the company having recently discontinued its Insecticide Division at Charleston, S. C.

At press time, no announcement had been made by Naco of a successor to Joseph Kracht as president of the subsidiary. Mr. Kracht resigned the first of the year to become an executive in Fedway Stores, Inc., New York.

•

Aldrin for Wireworm

Aldrin has been granted official label acceptance for control of wireworms on Irish potatoes by the United States Department of Agriculture, according to an announcement by F. W. Hatch, manager of the Julius Hyman & Company Division of Shell Chemical Corporation, Denver.

Wireworms, a soil-inhabiting form of the chick beetle, damage plant tubers, often making them unmarketable.

Tests made during the past four years in all major potato growing areas in the United States established aldrin's effectiveness against wireworms and show it to be one of the most economical methods of wireworm control yet developed, Mr. Hatch pointed out.

•

Stauffer Offers "Flotal"

Stauffer Chemical Co., New York, is introducing a new soil conditioner under the name "Flotal." It is being manufactured and will be distributed initially in northern California. It was developed and field tested originally by Rumianca Societa Per Azioni, Turin, Italy. It is derived from a ferric ammonium organic complex. The new product will be offered to other producers on a sublicense basis.

Dr. Blauvelt, Cornell, Dies

Dr. William Ernest Blauvelt, 49, professor of entomology at Cornell University and the first entomologist in New York State to work with florist crops, died unexpectedly at his home on February 2.

WILLIAM E. BLAUVELT

Known to greenhouse operators and nurserymen throughout the country, Dr. Blauvelt was largely responsible for reducing the insect problem of florists from top position to one of their lesser worries.

His efforts to control spider mites began in the 1930's. Working with the systemics on the "let the plant kill the bug" theory, he developed selenium as a soil treatment at a time when nothing was better. It is still widely and effectively used.

Azobenzene developed by Dr. Blauvelt was the first successful fumigant for spider mites on roses and proved particularly valuable to the rose grower at the beginning of the war when labor was difficult to get. It permitted rose growers to increase production by about 25 per cent and still is frequently employed in off-crop periods.

He next shifted to phosphate materials and with Dr. Floyd F. Smith of the USDA, he was responsible for the development of HETP, TEPP, and parathion aerosols for greenhouse use. His work in adapting parathion to greenhouse use earned him the award of the American Society of Florists in 1949.

At the time of his death, Dr. Blauvelt was at work developing combinations of insecticides that would be effective against resistant spider mites.

Dr. Blauvelt was a native of Mt. Vernon, New York and was graduated from Haverstraw High School. He received a B. S. degree from Cornell in 1926 and a Ph.D. degree in 1934. After graduation he was assistant county agent in Orange County in 1927 and in Niagara County in 1928.

He returned to Cornell as extension instructor in 1928 and became an assistant professor in 1945 and a full professor in 1947.

He was a member of Alpha Zeta Fraternity and Sigma Xi and Epsilon Sigma Phi, honorary societies, and of the Entomological Society of America and the American Association of Economic Entomologists. He had been secretary and later chairman of the Extension Section of the latter group.

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N. Central States Branch, E. S. A.

PROGRAM plans for the eighth annual conference of the North Central States Branch, Entomological Society of America, have been announced by Dr. L. K. Cutkomp, University of Minnesota, St. Paul, program chairman for the Branch. The meeting is scheduled to be held at the Hotel Statler, St. Louis, Mo., March 19 & 20.

T. H. Parks will be chairman of the opening session, March 19, with Dr. Charles E. Palm, Cornell University, president of the newly-organized Entomological Society of America addressing the assembly as the first part of the meeting

A symposium on insect resistance to chemicals will follow, with flies being discussed by W. N. Bruce; mosquitoes by W. R. Horsfall; plant-feeding pests by B. A. Porter; and household insects by Ralph Heal. The program also calls for reports on new equipment and new insecticides at this session.

Four concurrent sessions are scheduled for Thursday afternoon. The first, on fruit insects, will be under the chairmanship of R. Hutson, with C. R. Cutright as secretary. Eight papers are scheduled for this section. They are:

"Control Measures for the Red-Banded Leaf roller," Lee Jenkins; "The Abundance and Control of the Apple Maggot," C. R. Cutright; "Recent Advances in Plum Curculio Control," (Open discussion); "Present Status of Spider Mite Abundance and Control," D. W. Hamilton; "The Resistance of the Codling Moth to DDT and the Current Control Measures," (Open discussion); "The Peach Insect Problems," S. C. Chandler; "Strawberry Insect Control," G. E. Marshall; and "Occurrence and Control of the Periodical Cicada," T. H. Parks.

The second section, on insects of forests and ornamentals, will have as chairman, Roy Shenefelt, with H. J. McAloney, secretary. Participating in this part of the program will be James Butcher, L. L. English, R. B. Neiswander, D. M. Benjamin, L. C. Beckwith, A. T. Drooz, R. D. Shenefelt and R. R. Whitten.

Field crop insects will be the topic for discussion at the third section, of which T. A. Brindley will be chairman and Robert Staples, secretary. The value and use of insect surveys will be discussed in full by C. E. White, C. R. Weaver, E. T. Hibbs and H. B. Petty. Soil insects will be covered by H. C. Cox, J. H. Lilly and J. H. Bigger; while biological control of European corn borer will be explored by K. D. Arbuthnot, T. A. Brindley and H. L. Zimmack. Curtis Wilson will talk on "Factors Affecting the Abundance and Damage in Legume Stands"; Robert Staples, "Transmission of Wheat Mosaic by Insects"; and "Biological and Control Studies of the Brown Wheat Mite," by C. F. Henderson. A motion picture on control of the spittle bug will complete the session.

H. H. Ross will be chairman of a fourth section on "Problems in Insect Phylogeny" Thursday afternoon.

Monsanto Chemical Co., St. Louis, is to be host at a buffet supper and entertainment that evening, according to the advance program. Two concurrent technical sessions are on the program following the entertainment. A. E. Emerson is chairman of a section on problems in insect evolution, while H. Gunderson and H. B. Petty will be chairman and secretary, respectively, of a section on extension.

The program in this section will include a symposium on the use, cost and efficiency of the airplane in insect control by E. H. Fisher, T. H. Parks, H. B. Petty and Earle Raun participating. Dr. M. P. Jones will report on the National 4-H entomology contest and Mr. Gunderson will lead a discussion on the cooperative economic insect report in relation to extension uses.

R. L. Janes will present the question, "What Can Extension Entomologists Do to Secure a Better Public Understanding of our Science?" Claud Neiswander will present a report on the effectiveness of the "Ukaco" machine. An open discussion on the benefits from hiring extension specialists for specific fields of entomology will wind up the section's program.

Still another section, on apiculture and pollinating insects, will have as chairman, O. W. Clark, with R. L. Fischer, secretary.

Livestock Pest Control

FRIDAY'S program opens with a general session on economic entomology, with T. H. Parks presiding. Roy S. Pruitt will talk on insect-contaminated grain and the food law, followed by a discussion on the uses and precautions pertaining to systemic insecticides. B. N. Smallman will look into promising fields of use for systemics; while J. M. Manger will report on operational and residual precautions.

Phylogeny and biogeography will be the subject of a concurrent section under the chairmanship of Orlando Park.

Three concurrent sessions are scheduled for the final afternoon of the two-day meeting. Robert J. Dicke and W. M. Rogoff will be chairman and secretary, respectively, of a section on "Insects of Man and Domestic Animals." The cattle grub problem will be the subject of a discussion led by R. C. Bushland, while he and H. L. Haynes will talk respectively on chemotherapeutic measures on livestock and repellents for use on livestock.

A study of protection of stored products and control of household pests is scheduled for a third session Friday afternoon, with D. A. Wilbur, chairman and D. E. Gates, secretary. Taking part in this portion of the program will be H. H. Walkden, D. A. Wilbur, J. C. Frakenfeld, Norman Dennis, J. V. Osmun, Robert Fulton and D. E. Gates.

A section on insects of vegetables and canning crops comprises

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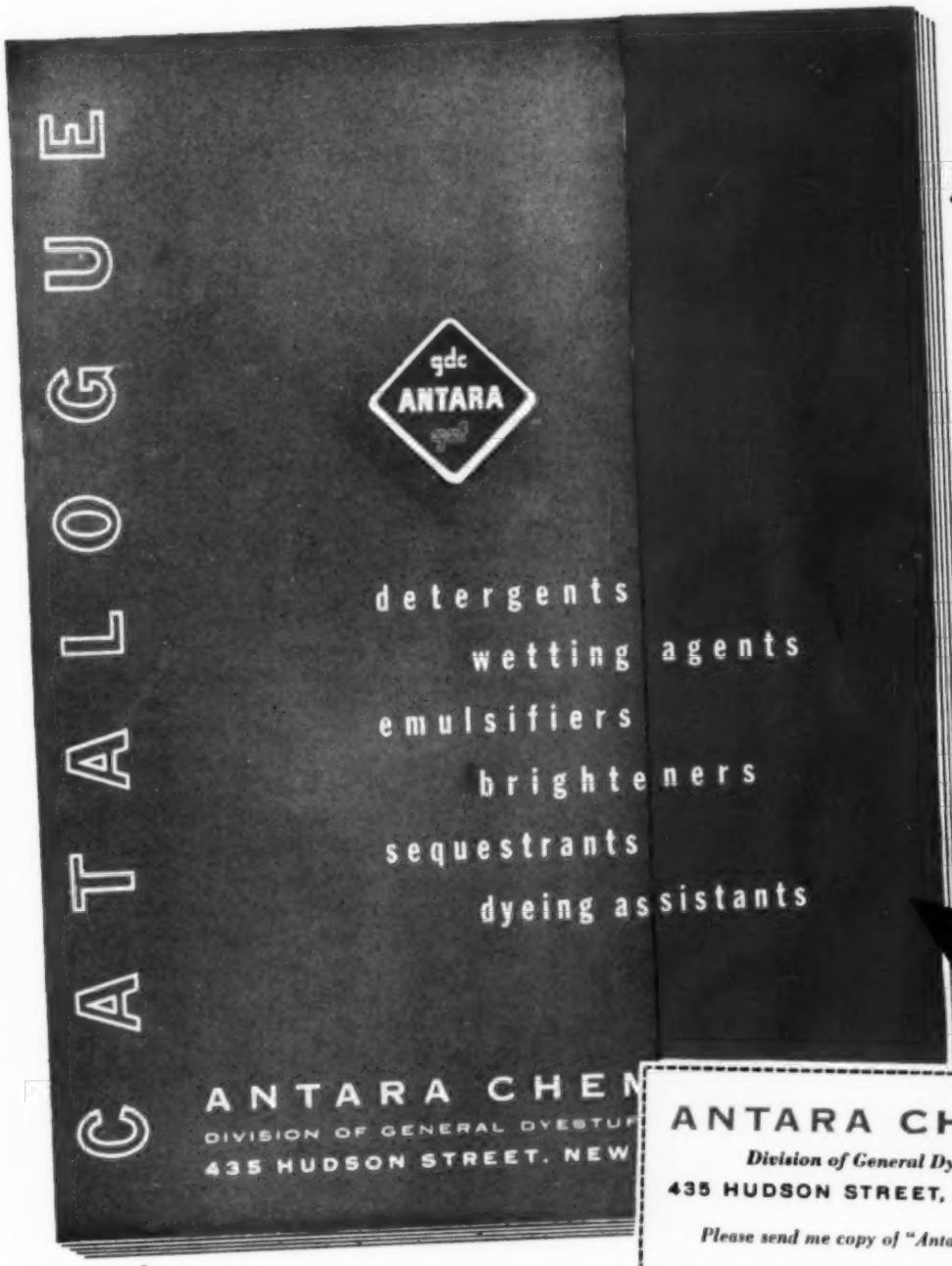

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the last concurrent session, to end the program. R. K. Chapman is chairman and George Gould, secretary. A panel on pest control of canning crops will feature J. H. Paullus, R. A. Blanchard, Wm. Luckman, and J. M. Wright.

Participating in the remainder of the program will be J. P. Sleesman, Roscoe Hill, J. M. Wright, R. K. Chapman and George Gould.★★

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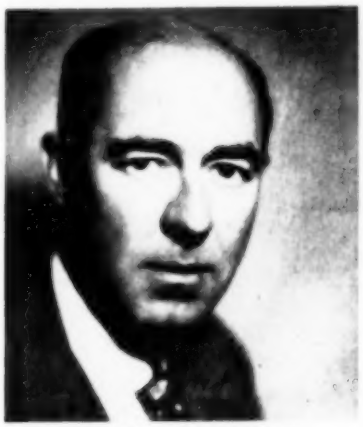
Becomes Consultant in Ga.



FRIAR M. THOMPSON, JR.

Friar M. Thompson, Jr., resigned as manager of the Insecticide Department of the Prentiss Drug & Chemical Co., New York, on March 1 to establish his own consulting business with office in Athens, Ga. He was associated with Prentiss for the past eight years and prior to that was engaged in insecticide research, development and sales work with the Hercules Powder Co., Wilmington, for fifteen years.

Mr. Thompson will specialize in insecticides, rodenticides, herbicides, fungicides, seed disinfectants, and in chemicals related to the southeast grasslands program. His research and testing facilities will include a 300 acre farm near Athens, Ga. He will also do work in rodent and insect control for household and industry, and in associated problems of sanitation. He has become associated as staff consultant with the Industrial Toxicological Laboratory, Philadelphia, and the Wisconsin Alumni Research Foundation, Madison, Wisc. Mr. Thompson holds degrees in agriculture and entomology from the University of Georgia and Rutgers University.

•

Retired Entomologist Dies

Albert F. Burgess, 79, until his retirement in 1942, chief entomologist of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, died February 23 at Brattleboro, Vt.

Mr. Burgess was a past president of the American Association of Economic Entomologists and was at one time chairman of the National Shade Tree Conference. He is author of "The History of the Gypsy Moth" scheduled for publication in 1953.

His widow and two sons, Emory D. and Albert F. Burgess, Jr., survive.

•

F.M.C. Names Crewson

George G. Crewson has been appointed technical consultant to the administrative staff of the Chemical Divisions, Food Machinery & Chemical Corporation, New York, N. Y., which include Buffalo Electro-Chemical Co., Inc., Niagara Chemical Division, Ohio-Apex, Inc., and Westvaco Chemical Division.

Technical consultant in the office of Chief of Chemical Warfare Service at Washington during World War II, Mr. Crewson for the past ten years has been director of engineering, Buffalo Electro-Chemical Co. in charge of engineering, construction and process improvement in connection with hydrogen peroxide processes used in the company's Buffalo, New York and Vancouver, Washington plants. He will continue in his present post at Buffalo Electro-Chemical Company but will also be available for consultation by all FMC divisions and plants.

GEORGE G. CREWSON

Avery to Ethyl Post

Julian M. Avery, who has been a consultant to Ethyl Corporation for the past two years, has joined the Ethyl staff as a technical adviser, it is announced. He will work primarily with the company's planning group on product development and research programs, and will be in charge of technical contacts in foreign countries.

COTTON STATES ESA

(Continued from Page 64)

work being carried on within the area covered by the Cotton States Branch.

The paper reading sessions were presided over by chairmen K. L. Cockerham, A. L. Hamner, R. C. Gaines, Dr. Clay Lyle, C. E. Smith, C. H. Alden, Dr. E. W. Dunnam, and J. W. Ingram.

Papers presented on Monday morning dealt principally with peach and pecan insect problems and control.

Monday afternoon's program was given to papers presenting information on insects from a public health stand-point, stored grain insects and forestry insects.

Tuesday morning's program included papers on soil insects, including white fringe beetle work, pollination problems, insecticides in granular form, insect surveys and toxicity of insecticides to several species of animals.

Tuesday afternoon's program consisted of papers dealing principally with cotton insects. They included papers on systemic poisons, spider mites, bollworms, tobacco bud worm, and relation of winter temperature, boll weevil survival, and summer rainfall to cotton yields.

The program on Wednesday morning was given to corn insect control. This included a panel discussion, led by Dr. A. N. Tissot on control of pests of sweet corn.

The program ended with a final business session which included the election of officers as noted above.

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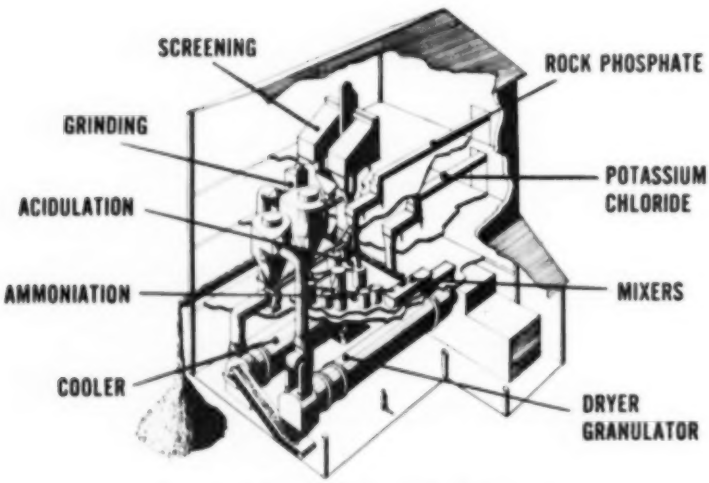

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Technical BRIEFS

Aromatics in Herbicides

The submersed water weed naiad, *Najas guadalupensis* (Spreng.) Morong., is commonly found in the irrigation and drainage systems of south Florida and appears to be more prevalent since the large scale removal of the water hyacinth *Eichhornia crassipes* Solms. Flow measurements on established slope courses show that naiad is the worst weed yet studied in reducing the capacity of drainage canals.

Mechanical methods of control have been practiced but are not very satisfactory. Greenhouse studies in 1948 for the rapid evaluation of the effects of several herbicides on naiad grown in glass containers indicated that certain aromatic solvents could be expected to control this weed. In 1950, field tests were carried out with the aromatic solvents "WS 1492," "WS 1494" and "WS 1495" having 99.5, 77, and 35% aromatics respectively. Application concentrations ranged from 200 to 500 ppm. Water in the lateral was pumped down to a low level prior to treatment and was returned to a normal level 48 hours after application of sprays. Herbicides were applied under water from a spray rig operated from a boat. The aromatic solvent "WS 1492" applied at the rate of 250 to 300 ppm gave a satisfactory control of naiad for three to four months. The solvents "WS 1494" and "WS 1495" gave very poor results. The herbicidal properties of these aromatic solvents appear to be directly associated with their aromatic content, the most herbicidal possessing the highest amount of aromatics.

By lowering the water level in the ditches prior to treatment the game fish temporarily escaped to deeper water while the less desirable garfish remained and were killed by the treatments. The game fish subsequently returned when the solvent had dissipated and the water was restored to normal levels.

—Summary of "Aromatic Solvents for the Control of the Submersed Water Weed Naiad, *Najas guadalupensis* (Spreng.) Morong., in South Florida," by Charles C. Seale, John W. Randolph and John C. Stephens, in *Weeds* Magazine, Vol. 1, No. 4, July, 1952.

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Weed Control in Asparagus

Field tests have been conducted with various chemicals in the summers of 1950, '51 and '52 for pre-emergence and post-emergence weeding of asparagus seedlings.

Carrot weeding oil of the Stoddard Solvent type has appeared promising as a selective weed killer in such plantings to the stage when seedlings have become about three inches high. At the rate of roughly 80 gallons per acre of treated surface, oil sprayed in a narrow band on top of the row of seedlings under various climatic conditions has generally resulted in little or no damage to the asparagus fronds. Larger fronds are safely sprayed by directing the material at the stems near the ground, taking care not to apply oil to the leaflets. Oil was a good pre-emergence weed killer.

As pre-emergence treatments, granular calcium cyanamide at the rate of 800 pounds per acre of treated surface and solutions of potassium cyanate (five to ten pounds per acre, 60 gallons water with or without a wetting agent) were effective. Post-emergence treatments with cyanamide and cyanate were promising in selectivity when applied in warm, relatively dry weather and followed by dew or rain after a lapse of a number of hours but seemed too injurious to the small seedlings for safety when applied in humid weather.

—"Weeding Asparagus Seedlings Chemically, 1950-1952," by S. B. LeCompte, Jr., Rutgers University, New Brunswick, N. J., Abstracts of paper presented before Northeastern Weed Control Conference, New Yorker Hotel, New York, January 7-9, 1953.

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Insect-Free Broccoli

Broccoli, produced largely for the frozen food market, is subject to insect attack from the time it is set in the field until it is killed by frost. Insecticides proving most useful for its protection include DDT, parathion and TEPP, with DDT still being the most effective material for cabbage caterpillar control. Its use on broccoli is rather limited, however, because of the residue it leaves. Thus, DDT can be used safely only in early applications or before the heads form.

TEPP is the most effective material available for cabbage aphid control, although it has little value against cabbage caterpillars except the newly-hatched stages. Parathion, on the other hand, while inferior to TEPP in its effectiveness against cabbage aphid, is superior to it in the control of cabbage caterpillars. Thus, it has an important place in the control program.

Insectidies for broccoli insect control have for the most part been applied in the form of dusts which, in general, have proved satisfactory. The dusts consist of (1) a combination dust consisting of 3 per cent DDT and 1 per cent parathion which is applied early in the growth of the plant before the heads begin to form, and (2) a 1 per cent TEPP or a 1 per cent parathion dust which is applied during the harvest period.

In 1952 dusting was compared with high and low gallonage spraying. The same amount of insecticide was applied per acre in each case. The results obtained showed that there was little difference in effectiveness

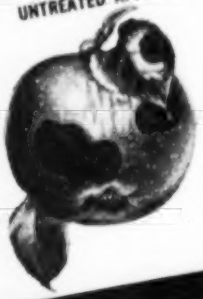
(*Turn to Page* 155)

the difference is...

UNTREATED CORN SEEDLINGS

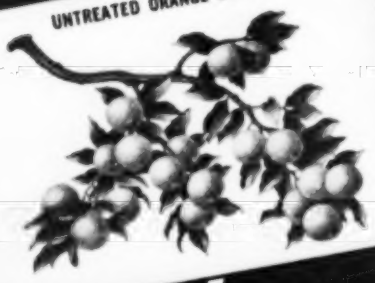
TREATED WITH SPERGON*

UNTREATED APPLE



TREATED WITH PHYGON*-XL

UNTREATED ORANGE BOUGH



TREATED WITH ARAMITE*

Naugatuck Chemicals

*U.S. Pat. No. 2,529,494

US AGRICULTURAL CHEMICALS

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division, Naugatuck, Conn.

manufacturers of seed protectants — Spergon, Spergon-DDT, Spergon-SL, Spergon-DDT-SL, Phygon Seed Protectant, Phygon Naugets, Phygon-XL-DDT, Thiram Naugets — fungicides — Spergon Wettable, Phygon-XL — insecticides — Synklor-48-E, Synklor-50-W — fungicide-insecticides — Spergon Gladiolus Dust, Phygon Rose Dust — miticides — Aramite.

Fertilizer Safety Meeting

Held in Atlanta March 2 and 3; Panel Discusses Plant Safety; Name Ellison Group Chairman

COVERING practically all phases of safety in fertilizer plants, the Fertilizer Section of the National Safety Council played a prominent part in the 14th annual Southern Safety Conference, held at the Biltmore Hotel, Atlanta, Ga., March 2 and 3. A panel discussion featured the program of March 2, while four talks on various aspects of safety in fertilizer plants occupied the final session on Tuesday.

A. B. Pettit, supervisor of Industrial Health and Safety, Davison Chemical Corp., Baltimore, Md., was chairman of the panel discussion of the first session. Written questions had been sent to him previously, and these queries were given to the panel members for reply. A thorough discussion, with audience participation, resulted from the presentation of the questions.

Panel members were George F. Dietz, safety director, Fertilizer Manufacturing Cooperative, Inc., Baltimore, Md.; F. Wayne High, manager of operations, Baugh Chemical Co., Baltimore, Md.; Curtis A. Cox, assistant manager, Manufacturing Department, Virginia-Carolina Chemical Corp., Richmond, Va.; and E. F. Carnell, superintendent, Davison Chemical Corp., Savannah, Ga.

In the Photo

Fertilizer Plant Safety panel at opening day of Atlanta meeting. Standing at rear: Vernon S. Gornto, chairman, Fertilizer Section, Southern Safety Conference of the N.S.C.

Seated, (L to R): Curtis A. Cox, Virginia-Carolina Chemical Corp., Richmond, Va.; F. Wayne High, Baugh Chemical Co., Baltimore, Md.; A. B. Pettit, Davison Chemical Corp., Baltimore, Md., panel moderator; E. F. Carnell, Davison Chemical Corp., Savannah, Ga.; and G. F. Dietz, Fertilizer Manufacturing Cooperative, Baltimore, Md.

The question of how to sell safety in a fertilizer plant was directed to Mr. Dietz who pointed out that such a project was no different from any other selling problem. He said that the promoter himself must be thoroughly sold on the idea, completely sincere, and must convince the employees that management is honestly trying to be helpful. He said that it is not too difficult to remind workers of the big stake each has in working safely; responsibility to his family and for his own well-being. Mr. Dietz emphasized that management itself must provide the initiative for instituting a safety drive in any plant.

How to handle dynamite caps and sticks safely was a query directed to Mr. Carnell. He advised that the printed instructions found in every carton, should be followed to the letter. Explosives should be stored in

small quantities, in dry, well-ventilated places either above or below ground. Such a place must be away from railways, highways, etc., and all contacts with metal such as nails must be avoided. Electric wires of all types must be kept away, he said, and for illumination, one should use acid-cell batteries. It was also pointed out that the close proximity of radio cars is also potentially dangerous near stored dynamite.

Costs of Accidents

IN reply to a question about hidden costs of accidents, Mr. High pointed out that even though accidents in a plant are obviously costly, there are numerous additional expenses, not so easily computed, but which in total amount to a sizeable figure. Some of these factors include lost time when an accident occurs, a decrease in output from other workers in the plant following a serious mishap; a general lowering of morale; the cost of training new men to replace the injured; and overtime made necessary from the letdown in efficiency. Mr. High declared that as much as 7% of the total payroll of a plant can go for such hidden expenses in connection with accidents.

Mr. Cox, in answer to a question about management's stake in safety, pointed out that there are many facts and figures to show unquestioned benefits to be derived from participation in safety programs. Among these are better public relations for a plant where accidents are less frequent; greatly improved production through such a program; and lower insurance premiums for fire and accident risks in plants where adequate safety precautions are observed. A safety program will definitely pay for itself, Mr. Cox declared.

FOURTEEN STATES REPRESENTED AT CONFERENCE

The Southern Safety Conference comprises 14 states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, Texas, Virginia and West Virginia. Some 1200 delegates were present at the over-all convention and good-sized audiences were on hand at the fertilizer section meetings.

Mr. High was asked about what operating standards should be set for self-propelled vehicles used in fertilizer plants. He pointed out that these machines, such as trucks, should never be serviced in the plant proper, but should be filled with gas and lubricated outside the plant. Otherwise, gasoline is likely to be spilled in dangerous places, increasing the fire hazard. He also suggested that fire extinguishers be carried on the vehicle to cope with any sudden fire. Brakes should be checked every day, he said, and personnel operating the machines should be chosen with an eye to their attitude toward safe operation and whether or not they are inclined to observe plant safety rules. "These boys must be trained for the job for their own protection," he declared.

Painting these vehicles a bright color is helpful, it was noted, but the speaker added that this won't help unless the dust is washed off rather frequently. In some plants, flashing red lights have been installed on vehicles to cut down accidents.

Cleaning Tanks Safely

HOW to clean confined areas safely, was a question put to Mr. Cox. Such problems arise in having to clean tank cars. He suggested that the best way to have a car cleaned is to send it back to the shop, if possible. But if the job must be done, every possible safety precaution must be observed, including that of having a rope around the workman so he can be pulled out quickly if necessary. A constant check on his reactions must be made while he is working, in order to catch the first indication of his being overcome. Workmen must be thoroughly indoctrinated to the dangers of such jobs so there will be absolutely no smoking nor other careless acts in connection. The tank car should be tested with meters which indicate the concentration of explosive gases to be positive of its condition, it was suggested.

"How should a safety program be started?" was also asked of Mr. Cox. He stated that the first prerequisite is a safety-minded management which will appoint some specific person in the plant to be responsible for safety development. Management must be made aware of the cost of accidents and conversely, aware also of the savings to be realized from their reduction. Safety meetings must be held on a regular schedule

Photo at left: A. B. Pettit, Vernon S. Gornto, and Stewart Washburn, National Safety Council, Chicago. Mr. Washburn has been assigned by the N.S.C. to the new Fertilizer Section.

to lend prestige to the program. Haphazardly-planned and scheduled meetings are not effective.

Good first aid equipment should be available immediately, even for slight scratches, as a subtle reminder that management really means to reduce accidents and to take care of all injuries, small or great.

All suggestions for safety should be followed up, to encourage further participation by employees, Mr. Cox concluded.

Problems of air pollution were touched on briefly, with chairman Pettit commenting that contaminants from fertilizer plants consist of dusts and solids, from dry mixing plants, and gas and vapors from other types of manufacture. The effects of such air pollution fall into three categories: nuisance, economic and health. A good scrubbing system in connection with the plant will usually eliminate most of the problem from this source, he said.

The answer to another question indicated that accidents peculiar to fertilizer plants include acid and alkali burns, danger from slides of stored fertilizer, and from falling. It is difficult to prevent slippery conditions of floors, it was pointed out.

Safe handling of nitric and sulfuric acid was the subject for brief discussion. It was pointed out that these materials, as well as phosphoric acid, are all under pressure and that since they are of corrosive nature, leaks in the system develop to create a hazard for workmen nearby. Systems should be under constant inspection to detect early any indication of flaws. Nitric acid was regarded as most hazardous, sulfuric acid next and phosphoric acid third. Training of employees, continual following up, and wise selection of workmen were given as essentials in attaining safe handling of these acids.

Mr. Dietz was asked the average rates of frequency and severity of accidents in the fertilizer industry. He quoted U. S. Department of Labor statistics indicating that in 1946, the fertilizer accident frequency rate was 35.7 against 15.7 for the chemical industry and 19.9 for all industry.

A year later the figures were 31.6, 12.6 and 18.8, respectively. The trend is still toward reducing both frequency and severity, but the industry still has opportunity for improvement. The lowest regional average was from the south Atlantic states, according to the National Safety Council, when 195 plants had attained a frequency rate of 26.7.

Electrical hazards in fertilizer plants are numerous, it was brought out in reply to a question regarding these. Motors become dust-filled if not blown out frequently, and become overheated to a dangerous degree. Loose wires, worn switches, uncontrolled sparks and carelessly-placed extension cords all contribute to the general hazard.

New Southern Chairman

MIKE C. ELLISON

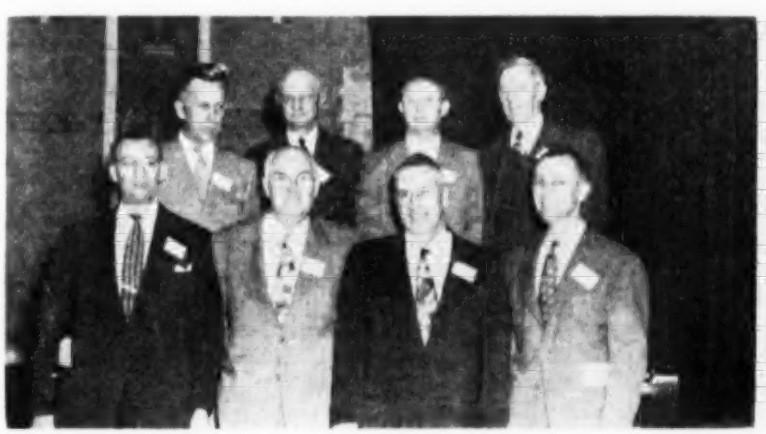
Mike C. Ellison, Mississippi Chemical Co., Yazoo City, Miss., was named chairman of the Fertilizer Section of the Southern Safety Conference at the Atlanta meetings.

Mr. Ellison succeeds Vernon S. Gornto, Smith-Douglass Co., Norfolk, Va., who is also secretary of the National Fertilizer Safety Section, N.S.C.

More Safety Angles

WITH Vernon S. Gornto as chairman, the second day's program featured four talks by industry representatives discussing safety from the standpoints of fire prevention; good housekeeping; the importance of foremen in the safety program in fertilizer plants; and a case history of one company's experience before and after instituting a thorough safety program.

O. R. Kiphart, safety supervisor, Phillips Chemical Co., Borger, Texas, talked on "The Maintenance Foreman's Responsibility." He reminded that many workers do only what they are made to do toward observing safety rules, and that the management must make the men *think*. They must become constantly aware of hazard. Such training should be so thorough, he declared, that good practices become a habit



At right: Executive Committee, Fertilizer Section of Southern Safety Conference: Front row (L to R): R. G. Diserens, Phillips Chemical Co., Bartlesville, Okla.; O. A. Dixon, International Minerals & Chemical Corp., East Point, Ga., (chairman); Mike C. Ellison, Mississippi Chemical Corp., Yazoo City, Miss., newly-elected chairman of Southern Fertilizer Section; and W. Rex Gabriel.

Rear (L to R): R. G. Alford, Gulf Fertilizer Co., Tampa, Fla.; T. R. Crown, American Agricultural Chemical Co., Atlanta, Ga.; W. D. Edwards, Goldsboro, N. C.; and Frank Kruck, Virginia-Carolina Chemical Corp., Richmond, Va.

and a workman will react correctly and instantly in an emergency.

The speaker likened the teaching of fertilizer plant workers to learning the multiplication tables. "Day after day we were taught that two times two is four, and from that we went on to more difficult problems," he said. But the point is that once these facts are well learned, one never mistakes the answer. The same type of instruction must be accomplished for safety, he declared. This must be done through the foreman, or it is not done at all.

Mr. Kiphart reported that at Phillips, plant managers and others all up and down the line are safety conscious. The foreman must know his men's habits and their natures in order to give them assignments of reasonable safety. "Work through the foreman and the safety program is likely to succeed. Work *around* him, and it is doomed," he concluded.

"The Importance of Fire Prevention" was pointed out in a talk by Walter Zielenske, fire prevention engineer, Marsh & McLennan, Chicago. He declared that although fire prevention is of obvious importance, there are angles that the fertilizer trade might observe in reducing insurance premiums and the possibility of loss through shutdowns caused by fires. Any construction of combustible materials is naturally hazardous, he noted, but it is possible to construct fertilizer plants with a minimum of fire hazard.

Usually, a fire in a wooden fertilizer plant runs its complete course, once under way. The best protection for a fertilizer plant is to consider fire prevention in the blueprint stage, he said. Features to be considered in planning a factory include the selection of the best site; fire-resistant construction; sensible occupancy of buildings (avoidance of storing highly combustible materials in inflammable structures), consideration of exposure to fire hazards from nearby buildings; and lastly, an appraisal of the type of protection available. Are there city fire hydrants close by? Does the city fire department cover the area of the plant? Is a sprinkler system or other similar protection afforded?

Naturally, the ideal construction would be of full fire-resistant material, but since the ideal is seldom achieved, fertilizer plants should be built with as many fire-protecting features as possible. The farther construction departs from full fire resistance, the greater the possibility of its destruction, Mr. Zielenske declared.

The speaker placed much emphasis upon the occupancy of buildings. He reported having seen concrete walls melted and fused in fires of particularly combustible material. Storage of ammonium nitrate, for instance, adds to one's insurance rates. Another potential hazard is the overnight storage of trucks in the plant . . . a practice against which Mr. Zielenske urged strongly.

The presence of automatic sprinklers is highly desirable, but even with such a system installed, constant maintenance is required to assure their being in perfect working condition. The corrosive atmosphere around a fertilizer manufacturing plant makes frequent inspections of valves particularly necessary. Hand fire extinguishers are also valuable, but they, too, must be maintained continually and the men must know where they are located and how to operate them.

E. O. Burroughs, Jr., manager, Insurance Department, F. S. Royster Guano Co., Norfolk, Va., talked on the value of "Housekeeping in Fertilizer Plants," using drawings of fertilizer plant scenes as the basis for his remarks.

He declared that plant housekeeping is related to at least three aspects of fertilizer plant operations. These include actual production, maintenance and repairs and capital protection.

Drawing on his long experience of inspecting fertilizer plants, Mr. Burroughs pointed out scores of potential hazards caused by downright carelessness. Situations where worn-out gears are left lying at the top of elevator shafts from where vibration will eventually cause them to fall; tools left where they were used last; debris and trash allowed to accumulate on stairs and platforms; hand trucks parked in runways and electric wires carelessly extended with unsafe cords tacked to wooden columns; this type of "housekeeping" lends itself to low production and inefficiency, not to mention its contribution to accidents.

Mr. Burroughs reported that one of his company's plants has established an enviable safety record during the past 15 years, with an average lost-time frequency of less than 5 over that period. Such emphasis on safe operation pays off in production, too, he said, this particular plant having recently made new records for tonnage production.

A. C. Thornton, industrial relations manager, International Minerals & Chemical Corp., Chicago, Ill., told the group how IMC safety program has succeeded not only in cutting down accident frequencies, but adding to production and profits.

He presented a "bird's eye view" of IMC's over-all safety policies, declaring that safety is one of the most important considerations to the company. "Legal and industrial safety codes, protection equipment and devices and standard safety practices are regarded as only minimum requirements by the corporation," Mr. Thornton declared. "The degree to which safety is practiced and encouraged in a company, affects not only the physical well-being of the employee, but also his general attitude and even that of the surrounding community toward the company," he observed.

How IMC organized safety teams was described by the speaker who reported that the operations of such teams have brought about permanent favorable results. Annual safety contests, with different plants competing against each other have developed wide interest in the subject.

Team surveys foster communications with all levels in the plants, he said. Publicity was given the project through company publications and through a handbook which set forth company safety practices.★★

LISTENING

Post

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

ACCORDING to Frank A. Haasis, of North Carolina State College, crown and stem rot caused by *Sclerotium rolfsii* is an important disease of Dutch iris in southeastern North Carolina, because many sites suitable for iris culture are infested, and the humid and warm climate is ideal for development of the fungus. The disease appears by mid-May and increases at an alarming rate through the summer months. Commercial growers have learned that early harvest of their bulbs reduces loss from this disease, but at some sacrifice in the yield and probably, also, in bulb quality which is subsequently reflected in less than maximum varietal performance.

An experiment was conducted at the Vegetable Research Laboratory near Wilmington, North Carolina, to determine whether or not the chemical chlorobromopropene (Shell Chemical Company "CBP") would reduce or eradicate this soil organism.

A well drained field in which two successive crops, tomatoes and shallots, had been heavily infected with *S. rolfsii*, was selected for the experiment. The field was laid off in four blocks, each containing four plots 18 x 100 feet. The large plots made possible the use of tractor-mounted equipment for applying the chemical.

The chemical was injected 6 inches deep in rows 12 inches apart by means of an "Insco pressure applicator" (Insect Control Sales and Service) with six outlets fitted to chisel plows mounted on a tractor cultivator. Row applications were made with the same equipment by using two injectors spaced 3 feet apart.

The following treatments were applied to the soil after it had been tilled and disked until ideal for planting:

(1) Chlorobromopropene at rate of 15 gal./A. applied in rows 1 foot apart on October 19, 1950.

(2) Chlorobromopropene at rate of 15 gal./A. applied in rows 1 foot apart on October 19, 1950. The soil was spaded prior to a second application of chlorobromopropene at 15 gal./A. in rows 1 foot apart on October 31, 1950.

(3) Chlorobromopropene at 15 gal./A. applied in rows 1 foot apart on October 19, 1950. The soil was spaded prior to a second applica-

TABLE 1

Soil fumigation with chlorobromopropene for control of *Sclerotium rolfsii* on Dutch iris as influenced by variety and bulb steep in formalin at planting. Data expressed as mean percentage of bulbs with signs of *S. rolfsii* at bulb harvest.

Soil treatment 1st application 10/19/50	Soil treatment 2nd application 10/31/50	Bulb treatment	Variety Imperator	Variety Wedgewood	Mean for soil X bulb treatment	Mean for soil treatment
15 gal./A.	15 gal./A.	Formalin	11.5	15.4	13.4	13.7
		None	11.3	16.7	14.0	
15 gal./A.	5 gal./A.	Formalin	5.6	13.3	9.4	8.1
		None	2.6	10.9	6.7	
15 gal./A.	None	Formalin	10.3	28.3	19.3	15.7
		None	11.5	13.0	12.2	
None	None	Formalin	37.2	37.4	37.3	32.0
		None	23.6	29.8	26.7	
					Non-significant	Least significant .05=13.7

				Mean effect for bulb treatment
Mean effect for variety X bulb treatment	Formalin	16.1	23.6	19.9
	None	12.2	17.6	14.9
	Non sig.			
Mean effect for variety		14.2	20.6	Non-significant
Least significant difference		.01=4.991		

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tion of chlorobromopropene at 5 gal./A. applied in rows 3 feet apart on October 31, 1950.

(4) No soil treatment.

Calibration of the equipment, at intervals, revealed that rates of application were approximately 10 percent in excess of those originally planned. Furthermore, variation was encountered between injection outlets, but none fell below the originally planned gallonage per acre.

In order to prevent excessive escape of fumigant from the soil surface, each plot was compacted with a drag immediately after treatment. Three hours after the first treatment was made a heavy precipitation (2.5 inches) also provided a water seal. This amount of rain, however, presumably interfered with dispersion of the gaseous phase of the chemical through the soil. The soil temperature, at time of treatment, was 65° F. at a depth of 6 inches.

Iris bulbs of Imperator and Wedgewood varieties were planted on November 10, 1950. Prior to planting, one half of the bulbs of each variety was steeped in a 1% formalin solution for 30 minutes. Hence, the final field lay-out consisted of four soil treatments split for varieties and again for bulb treatment, and each of these replicated four times. There were four test rows per plot, thus allowing for a treated border area, 3 feet wide, surrounding every set of rows.

Fertilization and cultivation procedures were the same as those of commercial practice. All plots were harvested by hand to minimize loss of bulbs.

Two criteria were used in evaluating treatment effects, namely: (1) the percentage of bulbs infected by and infested with *Sclerotium rolfsii* at harvest, and (2) total bulbs harvested per plot.

Results of Tests

PARTIAL control of *S. rolfsii* was achieved with injections of chlorobromopropene as evidenced by comparing the main effects of the soil treatments (Table 1). Amount of infection and infestation was significantly lower in each of the treated plots as compared with the untreated control. Although the three levels of treatment did not show a statistically significant difference one from the other, the trend toward least infection was in direct proportion to the amount of material applied or to the proximity of treatment to the soil environment of the iris plant. The data also indicate that the variety Wedgewood was more affected by *S. rolfsii* than was Imperator. Treating the bulbs in a formalin steep, prior to planting, failed to control *S. rolfsii*. Likewise, all interaction effects, for soil vs. bulb treatment and for variety vs. bulb treatment, were nonsignificant from the control standpoint.

The results obtained by evaluating treatments from the standpoint of total bulbs harvested present an entirely different picture (Table 2). The fact that the soil treatments did not affect the numbers of bulbs indicated that, under the conditions of this test, the amounts of chlorobromopropene applied were not injurious. Bulbs steeped in formalin, however, outyielded bulbs not treated. A difference in varietal performance was evident, which may or may not be real, since there were fewer Imperator bulbs than Wedgewood planted per plot.

Of greater interest than any of these main effect differences or conformities, is the highly significant interaction effect involving soil vs. bulb treatments, shown in Table 2. Bulbs steeped in formalin, prior to plant-

TABLE 2

Effect of soil treatment with chlorobromopropene, bulb treatment in formalin, and variety on yield of Dutch iris bulbs. Data expressed as mean number of bulbs harvested.

Soil treatment 1st application 10/19/50	Soil treatment 2nd application 10/31/50	Bulb treatment	Variety: Imperator	Variety: Wedgewood	Mean for soil X bulb treatment	Mean for soil treatment
15 gal./A.	15 gal./A.	Formalin	180	799	489	394
		None	125	473	299	
15 gal./A.	5 gal./A.	Formalin	171	781	476	353
		None	108	351	229	
15 gal./A.	None	Formalin	163	702	432	422
		None	170	652	411	
None	None	Formalin	188	734	461	437
		None	147	679	413	
					Least significant .01=101.79	Non-significant
					Mean effect for bulb treatment	
Mean effect for variety		Formalin	176	754	465	
X bulb treatment		None	137	539	338	
					Least significant .01=50.90	
Least significant difference		.01=89.18				
Mean effect for variety			156	646		
Least significant difference			.01=63.04			

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- Breaks the bottleneck of curing-bin capacity

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How NACCONOL is used

Dry Application:

Use Nacconol NR Flake or Dense Beads—the free flowing, non dusting types that disperse beautifully and uniformly. Add the required amount at the weighing hoppers or pre-mix with potash or other dry materials being used in the mixture. It is important that the Nacconol be distributed throughout the mix as thoroughly as possible.

Wet Application:

Use Nacconol NR Flakes or Nacconol Z Flakes—both readily dissolved in tap water. Where conditions permit, the required amount of either type of Nacconol may be dissolved and added directly to the mixer.

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Philadelphia 6, Pa., 200-204 S. Front St.	LOmbard 3-4382	Greensboro, N.C., Jefferson Standard Bldg.	GReensboro 2-2518
San Francisco 5, Cal., 517 Howard St.	SUtter 1-7507	Chattanooga 2, Tenn., James Building	Chattanooga 6-6347
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Charlotte 1, N.C., 201-203 West First St.	Charlotte 3-9221	Toronto 2, Canada, 137-143 Wellington St. W.	Empire 4-6495

ing, appeared to yield as of one population whether they were planted in soil receiving different levels of chlorobromopropene or in soil receiving no treatment. Non-treated bulbs planted in non-treated soil or in soil treated with a single application of chlorobromopropene at the rate of 15 gal./A. (incomplete fumigation?) also yielded in approximately the same proportion as the formalin-treated bulbs. On the other hand, untreated bulbs planted in soil thoroughly fumigated with chlorobromopropene survived at a much lower level. This phenomenon is explained by the fact that most of this loss in stands was due to the basal rot disease caused by *Fusarium* sp. (probably *F. oxysporum*). Hence, it appears that the *Fusarium* was carried on the bulbs at

(*Turn to Page* 149)

Hibernating Boll Weevil Study Expands

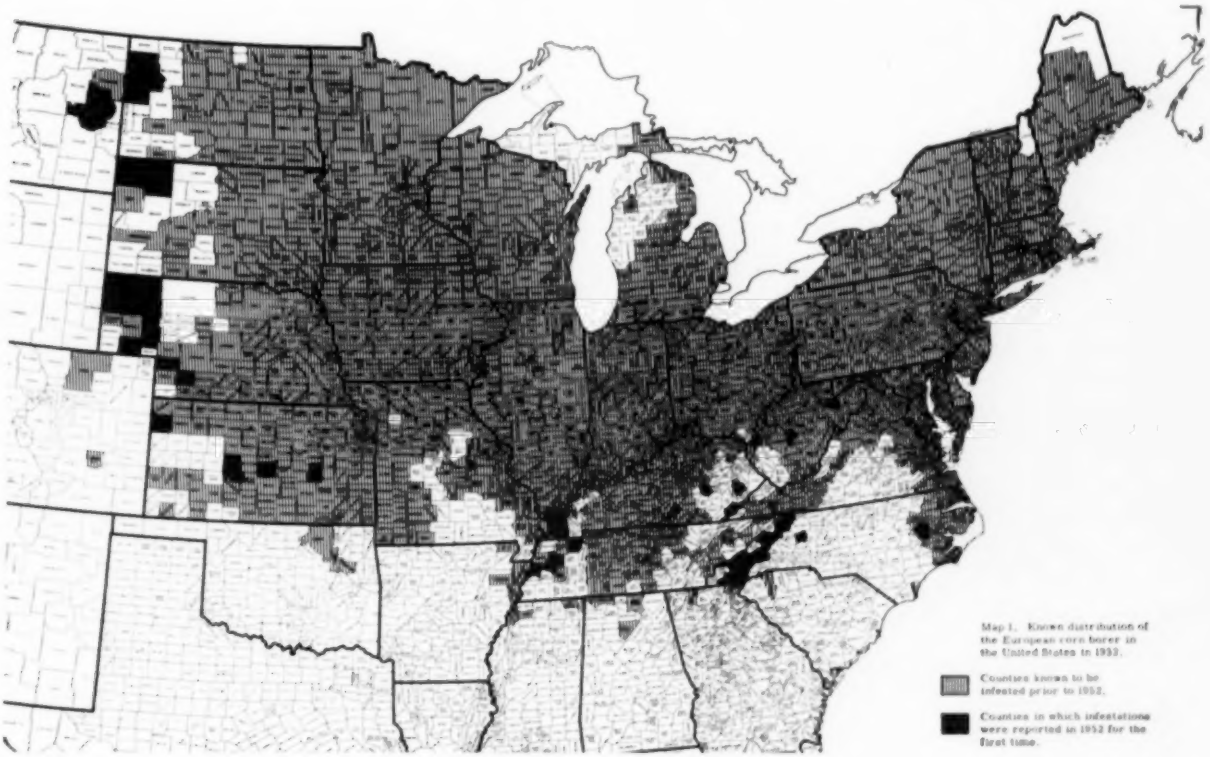
This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is connected with the Division of Insect Detection and Identification, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

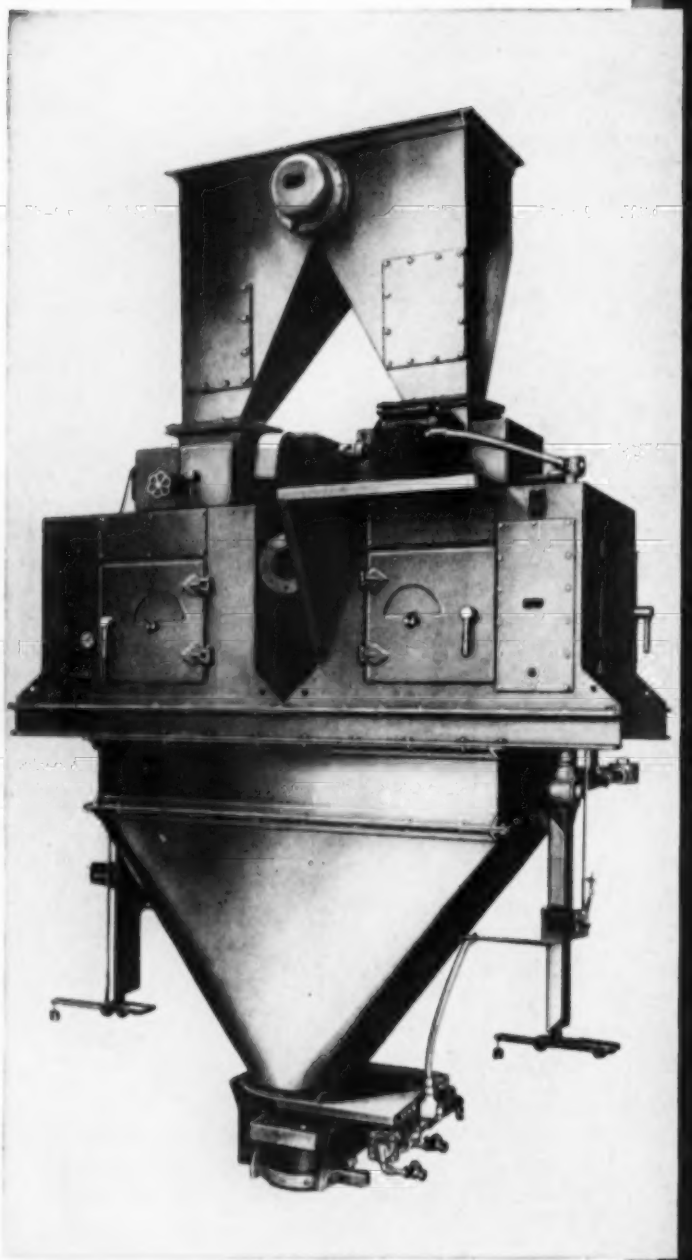
By Kelvin Dorward

THE practice of making fall hibernating boll weevil counts was extended to several additional states during 1952. To evaluate these figures, one must take into consideration the years of comparable data and the extent of the survey. In Louisiana, where fall trash examinations have been carried on for a number of years, two hundred surface or ground trash samples were examined in Madison parish. An average of 1,295 live boll weevils per acre of trash were found in the samples as compared to 1,367 found in 1951 fall examinations and 4,586 in 1950. The average number found in the past 16 years of fall examinations in Louisiana is 2,226 boll weevils per acre of trash.

Tennessee fall hibernation counts were made in McNairy County because of the heavy population of boll weevils during the past two seasons and the amount of cotton grown in the country. Ninety-five samples (5 per field) were examined. The average was 2,260 live boll weevils per acre of trash for the 19 fields, but in one field no weevils were found. There are no previous fall hibernation records for Tennessee.

In Georgia, the 250 samples of trash examined showed the average weevils per acre of surface trash to be 1,346 as compared to 852 in 1951. Broken down into areas the results were as follows: Northwest (Gordon County) 3,291, weevils per acre of trash, north central (Spalding County) 1,331; east central (Burke County) 726; and south (Tift County) 48. Live weevils were found on 21 or 84 percent of the 25 farms


Map 1. Known distribution of the European corn borer in the United States in 1953.
Counties known to be infested prior to 1952.
Counties in which infestations were reported in 1952 for the first time.



Designed for bagging fertilizers with *speed* up to 20 50-lb. or 80-lb. bags per minute[1]; *accuracy* usually to the split ounce, with a maximum range of 2 to 4 ounces; *savings* to $15 per hour[2] using economical open-mouth bags . . .

. . . this is the Richardson E-50 Duplex Automatic Bagging Scale . . .

. . . dust-tight, corrosion-resistant with *stainless steel.* The E-50 is also built in single and triplex units. Bulletin 0552 gives complete specifications—we'll be glad to send you one.

[1] Slightly slower on 100-lb. bags
[2] Cost analysis figures on request

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examined. In Arkansas, 112 trash samples were examined in Phillips, Lee and Crittenden Counties of eastern Arkansas and showed an average of 519 live weevils per acre of trash. Five samples from Green County in northeastern Arkansas were examined for an average of 484 live weevils per acre of trash. These are the first records available for fall ground trash examinations in Arkansas.

Fall trash examinations in Alabama were very limited, consisting of only 20 samples taken in central Alabama. Examination of these samples showed boll weevil counts varying from 0 to 9 per square yard of trash with an average of 2.6. On an acreage basis, the average was 12,584 live boll weevils per acre of trash. This is the first time fall hibernation counts have been made in central Alabama and with the small number of samples there is little basis for comparison. As in Louisiana, fall boll weevil hibernation counts have been made in South Carolina for several years. The 1952 fall weevil hibernation in Florence County, South Carolina, averaged 8,113 live weevils per acre of trash as compared to a low record of 1,575 in 1951. The average was 4,816 in 1950 and 10,744 in 1948.

European Corn Borer Status

(*See Map, Page* 103)

THE European corn borer, believed to have arrived in the United States in the early 1900's, is now known to be in 1,503 counties of 37 states. This is the same number of known infested states as in 1951, but there were 43 counties reported infested for the first time in 1952. In addition, 5 counties first observed as infested in 1950 or before but not previously reported were also added to the list. The States reporting these first records were: Kansas, 5 counties; Kentucky, 9; Montana, 2; Nebraska, 8; North Carolina, 13; North Dakota, 2; South Dakota, 2; Tennessee, 4; and W. Virginia 3.

Abundance surveys conducted after mid-September, in 728 counties of 25 states were made to determine the fall population of European corn borers. The average number of borers per 100 plants was higher in 1952 than in 1951 in 8 of the 12 Eastern States reporting. The weighted county average for all States in this area, however, was lower in 1952 than in 1951, because over half the counties surveyed were in the 4 States, New Jersey, Pennsylvania, Vermont and Virginia, that had lower populations in 1952. Southern Delaware had the heaviest infestation in the East. The over all average number of borers in the North Central States was only slightly higher than in 1951. There was a slight trend toward higher populations in Illinois, Iowa, Kansas, Kentucky, Minnesota, and South Dakota. The heaviest 1952 fall populations were approximately in the same areas as in 1951. This area consisted of adjoining sections of southeastern South Dakota, northwestern Iowa and southwestern Minnesota.

Map number 1 relating to the European corn borer shows the known distribution of the borer in 1952.

Midwestern Shade Tree Conference Considers Control Methods for

FOREST INSECT PESTS

by Noel B. Wysong

THE 8th annual meeting of the Midwestern Chapter of the National Shade Tree Conference was held February 11-13, 1953, in the Cosmopolitan Hotel, Denver, Colorado, attended by 244 members of the Conference and guests, some coming from such distant states as Massachusetts, Ohio, California and Oregon.

The group elected as president for the year, George W. Kelly, horticulturist, Colorado Forestry and Horticulture Association, and editor of "The Green Thumb," Denver Colo. Vice-president is L. R. Tehon, head, Section of Applied Botany and Plant Pathology, Illinois Natural History Survey, Urbana, Ill; and secretary-treasurer, Noel B. Wysong, Forest Reserve District of Cook County, River Forest, Ill.

Elected to the board of governors of both the Midwestern Chapter and the National Shade Tree Conference for a two-year term were John W. Swingle, arborist, Denver, Colorado; J. C. Carter, plant pathologist, Illinois Natural History Survey, Urbana, Illinois; Vance I. Shield, arborist, Clayton, Missouri; and Lloyd Beal, arborist, Omaha, Nebraska. Elected as alternates to the Board of Governors were Frank Hanbury, arborist, Omaha, Nebraska. Elected as alternates to the Board of Governors were Frank Hanbury, arborist, Peoria, Illinois; C. V. Schulhoff of Schulhoff Nurseries, Wheatridge, Colorado; Earl J. Sinnamon, arborist, Denver, Colorado; F. L. Dinsmore, arborist, St. Louis, Missouri; H. A. Morrison, arborist, Wilmette, Illinois; Carl E. Seliskar, plant pathologist, Colorado A. & M. College, Fort Collins, Colorado; and Larry C. Wachtel, arborist, Wauwatosa, Wisconsin.

Problems of general interest to those concerned with the propagation and maintenance of shade trees and ornamental shrubs were discussed, most emphasis being placed upon tree difficulties in the Rocky Mountain region. Great differences in precipitation, temperature extremes, and other climatic conditions there necessitate cultural treatment of trees vastly different from those practices generally followed in the east, mid-west and far west.

In discussing "Climatic Factors Affecting Tree Growth On The High Plains," A. C. Hildreth, superintendent of the Cheyenne Experimental Field Station, Cheyenne, Wyoming, said the American elm, Siberian elm, honey locust, hackberry, green ash, Russian olive and several species of junipers and pines survive better under semi-arid conditions common in the area.

To conserve all the water pos-

(*Turn to Page* 113)

HERE'S THE ANSWER TO YOUR SPREADING PROBLEMS!

AGAIN! "The NEW LEADER" leads the field

Commercial Fertilizer Attachment Head—Two Sizes: 19-foot or 23-foot

with its new "Motor-Driven Spreader" offering greater accuracy of spread with the most positive feed on the market!

SPECIAL ADVANTAGES — Uniformity of spread is not dependent on truck speed. Motor is mounted on catwalk and drives only the twin distributor discs at a constant speed, assuring full width of spread at all times together with uniform distribution.

Conveyor is separately driven from truck drive shaft by a series of V-belts to deliver the correct amount per acre—regardless of truck speed or regardless of whether the truck is driven in low, super-low or any other gear.

Conveyor speed is, therefore, positively synchronized with speed of the rear wheels of the truck and at each revolution of the rear wheels, the conveyor moves a given distance regardless of the truck's speed. Amount of material delivered by conveyor does not vary with hilly or soft field conditions.

Spreader Body Lengths (inside measure) are 9′, 11′, 13′ and 15′. Other body lengths on special order.

Note: When Spreading Attachment is folded up for road-traveling position, width is approximately 7′-5″.

"The NEW LEADER" Self Unloading Bulk Transport

The 20-ton capacity transport above is shown with elevator in place and ready to load a NEW LEADER Spreader truck. These units are proving very profitable; in bad weather they eliminate demurrage on railroad cars; fertilizer gets to the job quickly and spreader trucks can be kept working in the field. The transport, being a self-unloading unit, leaves the tractor truck free to return to pick up another transport load. These units have four individual compartments of 5 tons each. Each compartment may be unloaded independently of the others. Compartments and rear endgate are removable so that bagged and packaged goods may be hauled instead of bulk loads. Capacity 5 tons to 25 tons, lengths from 11 ft. to 40 ft. Written warranty with all NEW LEADER equipment. Write today for specifications, prices, etc. Fast delivery service sells fertilizer!

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MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

Fertilizer Safety Committee Meets in Chicago

Members of the Fertilizer Safety Section, Executive Committee pictured at recent meeting in Chicago. Left to right, top row: Roger L. Hugg, International Minerals & Chemical Corp., Chicago Illinois; Curtis A. Cox, Virginia-Carolina Chemical Co., Richmond, Virginia; J. L. Shopen, Consumers Cooperative Association, Kansas City, Missouri; F. Wayne High, Baugh Chemical Company, Baltimore, Maryland; and Paul T. Truitt, president, American Plant Food Council, Washington, D. C.

Left to right, bottom row: Jack Fields, safety director, Phillips Chemical Co., Bartlesville, Oklahoma; Ned Dearborn, President, National Safety Council, Chicago, Illinois; A. B. Pettit, safety director, Davison Chemical Co., Baltimore, Maryland; and Edwin C. Kapusta, National Fertilizer Association, Washington, D. C.

MEETING in Chicago in January, the executive committee of the Fertilizer Section of the National Safety Council discussed ways and means to bring about further progress in the movement which has enjoyed a good reception by the industry.

A. B. Pettit, Davison Chemical Corp., Baltimore, Md., chairman of the Fertilizer Section's Engineering Committee, gave a report to the group on how the sectional status was achieved late in 1952. Further reports were given by the Engineering Committee, telling how to set up formal safety programs in various plants, and also how technical information might be provided to aid in solving mechanical problems in connection with safety in fertilizer plants.

The Engineering Committee is preparing drafts for data sheets which will reach fertilizer plants throughout the U. S., it is reported. In addition, work will be done through the Visual Aids and Speakers' Bureau in connection with furnishing film strips and safety posters for fertilizer plants through the National Safety Council and in preparing film strip material applicable to fertilizer operations.

•

CSC Names New Director

Harold W. Comfort, executive vice-president of the Borden Company has been elected to the board of directors of Commercial Solvents Corporation, it has been announced by J. Albert Wood, president.

Mr. Comfort has been associated with the Borden Company since 1928 when the Reid Ice Cream Company, of which he was general sales manager, joined the Borden organization. He became a vice-president of the Borden Company in 1937, a director in 1938, and executive vice-president in 1944.

•

Monsanto Moves Two

The appointment of Dr. Hal G. Johnson of St. Louis as director of research and development for Monsanto Chemical Company's Western Division, has been announced by Irving C. Smith, general manager.

At the same time, John T. Stephan of Seattle was named associate director of research for the division. Both appoinments will become effective April 1.

Dr. Johnson has been assistant director of the company's General Development Department. He will be headquartered at Santa Clara, Calif.

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Arsenate of Calcium
Basic Copper Arsenate

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50-50 DDT Wettable
50-50 DDT Non-Wettable
75-25 DDT Wettable
75-25 DDT Non-Wettable
25% DDT Emulsifiable

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Wettable Sulfurs
Dusting Sulfurs

COPPER COMPOUNDS
Tri-Basic Copper Sulfate

ZINC COMPOUNDS
Zinc Sulfate (36% Zinc)
Safe-N-Lead (Zinc Hydrate)

CHLORDANE COMPOSITIONS
Chlordane 40% Wettable
Chlordane 45% Emulsifiable
Chlordane 72% Emulsifiable

PARATHION COMPOSITIONS
Parathion 15% Wettable
Parathion 25% Wettable
Parathion 25% Emulsifiable

DMC (p-chlorophenyl methyl carbinol) COMPOSITIONS
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Barnet to New Post

Fulton Bag & Cotton Mills have announced that Fred G. Barnet

FRED G. BARNET

is now assistant manager of their Dallas operations.

Mr. Barnet is a great-grandson of Jacob Elsas, the founder of the business, and has been associated with the company since leaving the University of Virginia in June, 1939. He worked in the Atlanta plant in various capacities and served in the submarine branch of the U.S. Navy for three years during the War. Following separation from the service, he returned to Atlanta and continued his work there until he was transferred to Dallas in April, 1949.

Mr. Barnet is a director of the company and will assist George W. Williams, manager of the Dallas plant, in the general operation and supervision of Fulton's activities in the southwest.

•

Conn. Fruit Growers Meet

The annual mid-winter meeting for Connecticut fruit growers, arranged by the New Haven County Extension Station Service, was held at The Connecticut Agricultural Experiment Station February 17. An all day affair, the meeting featured cost of production problems and the depreciation of orchard soil.

V. R. Gardner, former director of the Michigan Agricultural Experiment Station and now visiting professor at Rutgers University, spoke on "Hidden Hunger—Are You Short Changing the Apple Tree? He discussed three phases of soil starvation—soil acidity, nutritional level, and physiology of the tree.

A panel of trades people and fruit growers looked at production costs. Dr. Philip Garman, entomologist at the Connecticut Station, was master of ceremonies.

Other speakers included Arthur C. Bobb, extension fruit specialist at the University of Connecticut, "The State of the Fruit Industry"; William Tunis, extension entomologist, University of Connecticut, "1953 Spray Program," and Roy E. Norcross, New Haven County agricultural agent, who reported on the advertising campaign conducted by fruit growers.

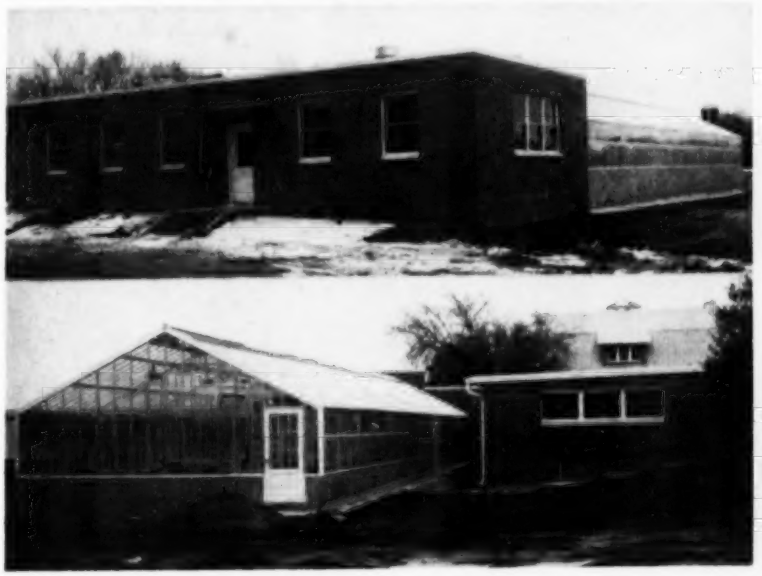
A welcome from Dr. James G. Horsfall, director of the Connecticut Station opened the meeting.

•

Controls Off Phosphate

The Office of Price Stabilization has decontrolled phosphate rock, through Amendment 40 to General Overriding Regulation 9. It was the first such decontrol affecting fertilizer materials.

New Insectary for Nebraska University

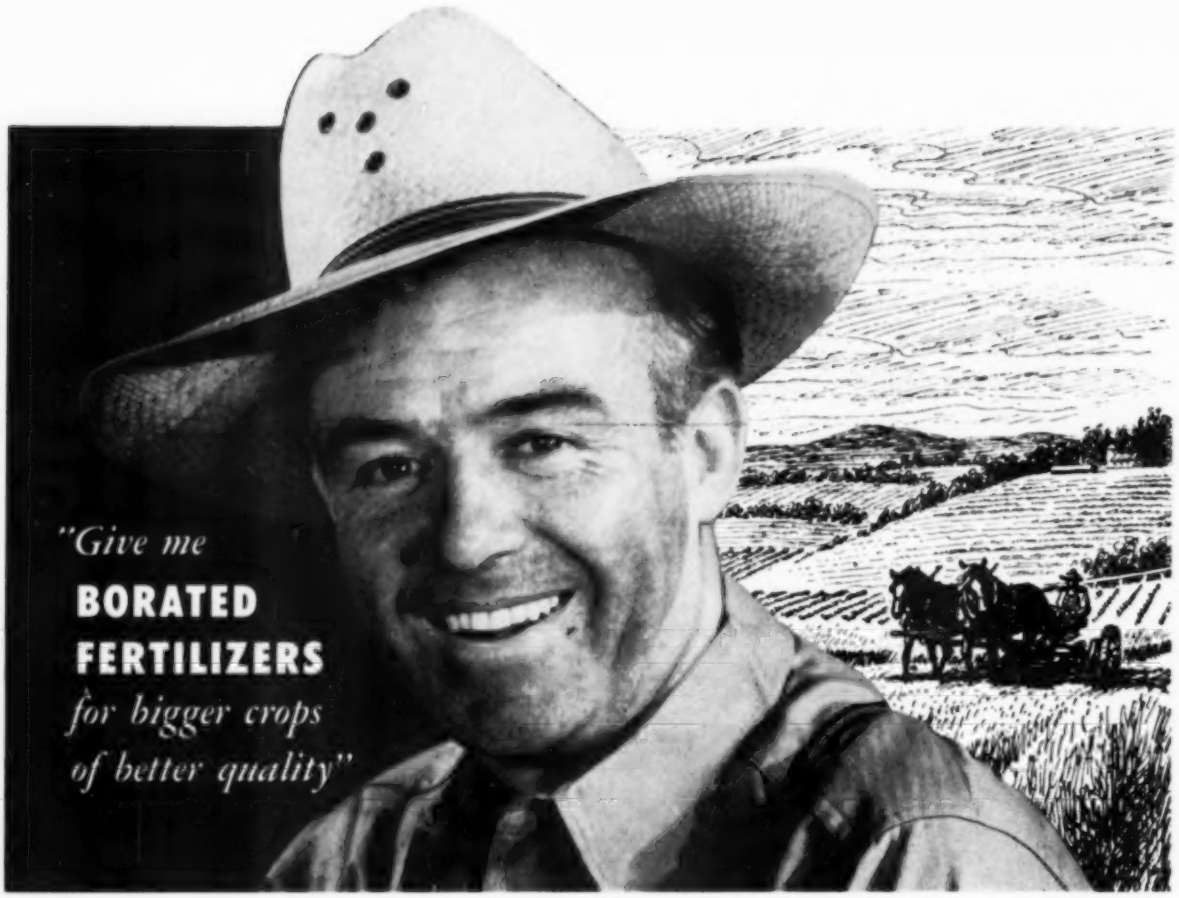


Announcement of the near completion of the Insectary, or Entomology Research Laboratory on the campus of the College of Agriculture, of Nebraska, Lincoln, has been made by Roscoe E. Hill, chairman of the Department of Entomology. The new unit consists of a U-shaped structure comprising a one-story brick building with basement; a greenhouse, a screenhouse and a work shop.

According to Mr. Hill, the brick structure is 60 by 25 feet, the first floor of which houses two offices, a beekeeping laboratory and an insect toxicology laboratory. In the basement there is a large room containing four constant temperature cabinets for rearing cultures of insects and an especially designed table for rearing plants. A cold storage room containing a freezing unit and two constant temperature cabinets, two small insect rearing rooms, an equipment room and shower complete the facilities in the basement.

The greenhouse is approximately 90 by 25 feet and consists of six separate compartments. Temperatures may be controlled in each compartment separately. Work will be done in the greenhouse space during the winter months. Similar work will be conducted in the screenhouse (40 by 20 feet) during the summer months. The work shop (21 by 20 feet) will be utilized as a potting room and as a place in which to construct cages and to repair equipment.

Laboratory facilities for use of students taking courses in beekeeping and insect toxicology are available in the brick building. Provisions for research by both advanced students and the regular Experiment Station staff are to be available throughout all sections of the insectary. The offices and laboratories will be furnished with the customary equipment plus some special equipment, including six constant temperature cabinets, a fume hood, honey extractor, especially designed rearing table for plants, and spray and dust towers.



BORAX restores lost boron to soil

Yes, Borax does restore lost Boron to soils . . . the Boron that is so essential to fine, healthy crops and big yields. Although the amount of Boron required is extremely small, its importance is comparable to Nitrogen, Potash and the other essential plant foods. Don't let a Boron deficiency in soil cause crops to dwindle and plants to grow puny. Use Fertilizer Borates, the low-cost fertilizer grade of Borax, to restore the boron—then watch the yields of alfalfa, pasture crops, and many vegetable, field and fruit crops as well, increase and improve in quality!

FERTILIZER BORATE-HIGH GRADE, developed especially for the fertilizer trade, is an ore concentrate rich in Boron (*contains approximately 121% Borax equivalent*). In formulating mixtures containing Borax, only 82.9 lbs. of FERTILIZER BORATE-HIGH GRADE is required for each 100 lbs. Borax that you guarantee. Because water content is held to approximately 24% water (5 mols) this material also saves you important money in costs of transportation, storage and handling, etc.

FERTILIZER BORATE (*equivalent to approximately 93% Borax*) and FERTILIZER BORATE-HIGH GRADE (*equivalent to approximately 121% Borax*) come in fine mesh for addition to mixed fertilizer, or coarse mesh for direct application where required. County Agents or State Experimental Stations should be consulted for detailed recommendations. Write today for literature and price quotations!

FERTILIZER BORATE—The Low-Cost Fertilizer Borax

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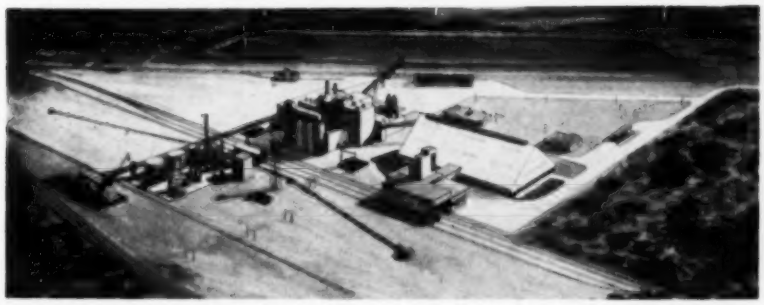
Davison's New Triple Super Plant in Fla.



Shown is an artist's rendering of Davison's plant now under construction at Bartow, Fla. The area shown as occupied by the plant is approximately 45 acres.

Illustrated at the left is sulfur storage and next to it the contact sulphuric acid plant, daily capacity 550 tons; acid is transferred above railroad tracks to main process building—note storage silos with capacity of 1,000 tons of phosphate rock, near the tracks. Long building in background houses the shops; the group of buildings to the right includes shipping facilities and finished product warehouse, the latter 325 feet long; above the warehouse, at left, the office and laboratory; right, the change house.

OPERATION is expected early in 1954, at the $12,410,000 plant for production of triple superphosphate which The Davison Chemical Corporation is constructing at Bartow, Florida, the company has announced. It will have an annual capacity of 200,000 tons of the agricultural chemical and according to a recent survey by the Florida Development Commission, is the largest among $35,000,000 in construction projects which the phosphate rock industry now has under way.

The plant will mark Davison's entry into triple superphosphate production and is expected to establish the company as a major producer of the chemical. Total capacity in the industry is estimated currently at 770,000 tons annually. By 1954, Davison's output added to other new and expanded operations will bring the industry's total estimated capacity to more than 1,000,000 tons annually. However, demand by the end of that year is expected to reach 1,600,000 tons, based on forecasts by the United States Department of Agriculture.

Production of sulphuric acid will also be started in Florida in connection with the triple superphosphate plant. The Dorr Company, Stamford, Conn. are architect engineers and this will be the first triple superphosphate plant in the United States employing the patented Dorr process. Sulphuric acid is reacted with phosphate rock to produce phosphoric acid, which in turn is applied to additional posphate rock for triple superphosphate production. The final product will be in both granulated and pulverized forms.

Triple superphosphate is a concentrated source of phosphates for application to the land. Its use for direct application or in mixed fertilizers introduces economies in packaging, shipping and handling and these advantages account for the current high rate of demand. Running to about 45 per cent P_2O_5, as against a maximum of about 20 per cent for normal superphosphate, the former is essential in "high analysis" fertilizer formulations, being recommended by state experiment stations and other sources of advice to farmers.

•

Detecting BHC Residues

Beech - Nut Packing Co., Canajoharie, N. Y. has developed a new and effective method of detecting residues of benzene hexachloride. The company's food laboratory, faced with the necessity of detecting such residues, has come up with a six-step technique worked out by Wendel F. Phillips of Beech-Nut.

These steps, as described by Mr. Phillips, are as follows:

(1) Removal of BHC from the material under examination by use of a suitable solvent.

(2) Acid hydrolysis and water washing to eliminate the unwanted extractives.

(3) Refluxing the residue obtained with purified aniline.

(4) Separation of the reaction products.

(5) Color formation by the action of vanadic acid.

(6) Measurement of the intensity of the color formed with a colorimeter or any suitable instrument at approximately 510 mu.

The amount of benzene hexachloride present is estimated from a standard curve obtained by carrying known amounts of BHC through the entire procedure and plotting the per cent transmittance vs. concentration on 1 cycle semi-log paper.

Comparatively large amounts of other chlorinated hydrocarbons which dehydrohalogenate under alkaline conditions may cause interference. However, these compounds are not usually encountered in the quantities necessary to produce any color.

The method has been applicable to most fruits, vegetables, soils and meat products. When excessive amounts of fats and waxes are found they may be eliminated by chromatographic separation.

•

Geigy Enlarges Miss. Plant

Geigy Co., Inc., New York, has recently completed a 12,000-square-foot addition to its Leland, Miss., factory. The addition nearly doubles the area of the original plant which was put up in 1951. Construction was done by the Luria Engineering Company.

The addition is a standardized one-story, steel-frame structure, with corrugated steel sides and roof. The new building is 100 feet long.

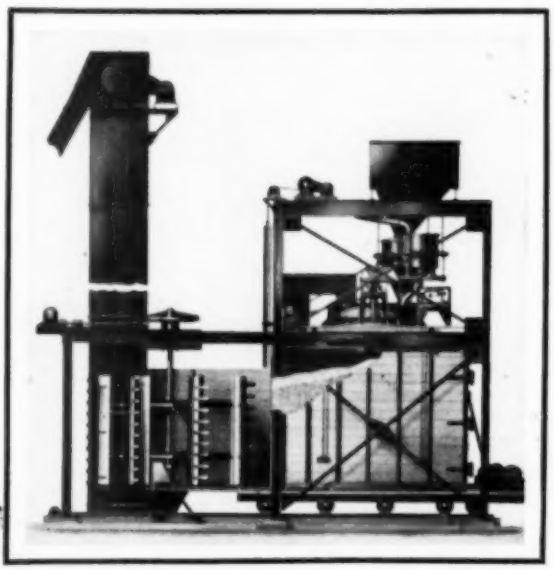
An Important Announcement

STURTEVANT
Continuous or Batch Den and Excavator

can be used either with sulphuric acid, phosphoric acid or a mixture of both, mixed with phosphate rock for producing superior superphosphate either single, enriched or triple . . .

QUICKLY and ECONOMICALLY!

Sturtevant Mill Company has been a leader in the design and manufacture of fertilizer equipment for over half a century. Its equipment has been cutting costs and increasing production the world over. You, too, can benefit with Sturtevant. The experience gained throughout the years is yours without cost or obligation. Write for the services of a Sturtevant trained fertilizer engineer, whether it be for individual equipment or the design of a complete plant. He can help you save time, increase tonnage.



Continuous Den or Batch Den and Excavator for producing superphosphate.

BUILDERS OF COMPLETE FERTILIZER PLANTS

STURTEVANT MILL Company

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CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

SHADE TREE MEET

(Continued from Page 105)

sibile he recommended keeping the soil cultivated around planted trees, and maintaining the land in the root zones of the trees free from weeds and grass. To correct plant chlorosis induced by the high alkali content of the soil, he suggested an iron salt solution applied as a spray on the foliage particularly for orchard trees, and added that it was usually desirable to include with the iron spray some standard insecticide for insect control.

"In the mid-west there appears to be a definite upward trend in the incidence of such scale insects as cottony maple scale, scurfy scale, European elm scale and Putman scale," asserted E. F. Herrbach, horticulturist, Standard Oil Company, Chicago, Illinois, in speaking on the topic "Sap-Sucking Insect Pests Of Ornamentals." Most of the sucking insects are small and inconspicuous, he pointed out, and usually remain undetected until they have caused considerable die-back of branches or more severe injury.

Listing parasitic wasps, ladybird beetles, lace-wing insects and inclement weather as the principal natural enemies of many of the sap-sucking insects. Mr. Herrbach warned that these could not be depended upon alone for control. Among the sucking insects of greatest concern to arborists and tree owners in the mid-west, he said, are scale insects, aphids, spider mites and leaf-hoppers. For the control of these insect pests he suggested the following:

Scale insects: Dormant oil sprays varying in dosage from 2½ to 7 gallons per 100 gallons of water applied with a conventional hydraulic sprayer. For summer treatment of the crawlers of oyster shell, scurfy, San Jose, pine needle and euonymus scale, (per 100 gallons of water applied with a hydraulic sprayer,) 2 qts. 25% DDT white oil emulsion concentrate; or, 2 qts. 25% DDT emulsion concentrate; or, 2 lbs. 50% wettable DDT; or, 1 gallon (actual) summer oil. He warned that close attention must be given to timing, applying the spray shortly after hatching occurs and covering the tree thoroughly.

In spray tests conducted last summer on crawlers of cottony maple scale he reported that good to excellent kills were secured with use of 2 qts. 25% DDT-white oil concentrate per 100 gallons of water, and with 2 qts. 25% DDT emulsion concentrate per 100 gallons of water, the materials being applied with a hydraulic sprayer. Slight leaf-burn occurred, however.

In mist blower applications using 1:3 dilution 25% DDT-white oil emulsion concentrate, and 1:3 dilution 25% DDT emulsion concentrate, a high percentage of kill was obtained when heavy applications were made; no foliage injury resulted.

Aphids: Control varies with the species of aphid involved. For pine bark aphid: (per 100 gallons of water applied with hydraulic sprayer) 3 to 4 per cent dormant oil; or, 1 lb. lindane wettable powder when immature aphids are present in late spring. Snowball or viburnum aphid: 2 qts. "Krenite," "Elgetol" or similar in spring dormant sprays. Aphids on elm, beech, willow, birch, maple, sycamore, etc., treat in the spring before the leaves are curled with 1 lb. 25% lindane wettable; or, 1 gallon summer oil plus ½ pint nicotine sulfate plus 3 lbs. soap; or, ¼ to ½ pint TEPP. Spruce gall aphids: 3 gallons dormant oil—spring dormant; or, 1 pint nicotine sulfate plus 3 lbs. soap in spring dormant.

MEETING CALENDAR

National Agricultural Chemicals Assn., Jung Hotel, New Orleans, La., March 11-13.

American Chemical Society, Pesticide Division, Hotels Statler and Biltmore, Los Angeles, Calif., March 15-19.

South Dakota Weed Control Conf., Pierre, S. Dakota, March 17-19.

North Central States Branch, A.A.-E.E., Statler Hotel, St. Louis, Mo., March 19 and 20.

American Plant Food Council, The Homestead, Hot Springs, Va., June 11-14

National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 15-17, 1953.

Southern Feed & Fertilizer Control Officials, Clemson, S. C., June 22 & 23

Pacific Branch, A.A.E.E., Lake Tahoe, Calif., June 23, 24 & 25, 1953.

Annual South Carolina Fertilizer Conference, Pee Dee Experiment Station, Florence, S. C., July 15. (Tentative)

WASHINGTON

(Continued from Page 61)

theless, stocks in the hands of dealers and farmers have declined in value without any price protection, except insofar as individual formulators or distributors may have desired to pass this protection along. Therefore, it is unlikely that there will be any great amount of early buying for insurance purposes.

* * * * * *

The entomologists, on the other hand, are reluctant to make any prediction as to the nature of the infestation during the coming season. Generally, it has been a mild winter which points to the possibility that over-wintering insects may have survived in greater numbers and the chances of an outbreak are rather great. However, the depressed farm prices and the uncertainty of farm policies of the new administration, all will add to the overall reluctance on the part of users to become enthusiastic over early buying.

* * * * * *

More optimistic members of the industry have expressed opinions that when materials do start to move to the formulator and distributor level, there will be a consequent rush to buy in materials at the first sign of movement of goods out of their own warehouses. However, the more realistic members of the industry are quick to point out that there must be shortly a sharp increase in prices and demand in order to have sufficient quantities of material available when needed in the field. The National Agricultural Chemicals Association is to stress this type of promotional activity at its New Orleans convention; and it would also appear logical for the Department of Agriculture to point out these facts to their various state and county organizations, in order to spur a "buy-early for insurance" program.

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Our own fertilizer plants have been experimenting with wetting agents to reduce curing time and prevent secondary caking of mixed fertilizers. **SUL-FON-ATE AA 9** has been found to be very effective in this application and it is now being regularly used by our plants.

Tennessee's **SUL-FON-ATE AA 9** is an alkyl aryl sulfonate containing 90% active ingredient. It is a powerful wetting and penetrating agent that promotes better contact between the fertilizer components. This intimate contact reduces the time required for completion of the reaction.

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TREATED

These pictures show the effect of the addition of Tennessee's **SUL-FON-ATE AA 9** to one of our more troublesome formulas: Four units of nitrogen came from solution and the other two from sulphate of ammonia. Both samples were cured for 4 days and then bagged. The bags were stacked for 10 days and the above samples were taken from the bottom bags.

METHOD OF APPLICATION

Since manufacturing processes vary widely in fertilizer plants, the best method of introduction into the mixer must be determined at each plant. Our plants prefer to distribute it on the conveyor belt feeding into the mixer. In the pictures shown **SUL-FON-ATE AA 9** was added to the potash. It is not necessary to make any changes in operating procedure.

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National Research Council Asks Pretesting of Pesticides

THE Food Protection Committee of the National Research Council went on record last month as favoring a requirement that chemical pesticides should be pre-tested before they are placed on the market. The Council also offered a suggested schedule of analytical procedures that might serve in evaluating such products. Clear establishment of the performance and safe records of pesticides was called for before such products are offered for commercial use.

The committee statement conceded, however, that complete knowledge of many factors pertaining to pesticide usage, performance and ultimate safety can be developed only through actual use in large-scale performance tests. Hence, any system proposed for regulating the distribution of new materials should provide for their orderly release with recognized steps between strictly controlled small-plot experiments and large-scale commercial operations.

"Only a portion of the desired data can be obtained through observations on usage on non-food crops," the statement continued. "Therefore, progress would be greatly enhanced by large-scale experimental or otherwise provisional use of a promising material on a nominal percentage of a given crop as soon as residue and subacute or preliminary chronic toxicity data establish its safety beyond a reasonable doubt.

"Since chronic toxicity largely pertains to a continuous intake of marginal quantities of a chemical over long periods of time, the possible temporary occurrence of such a residue on a nominal percentage of a crop would create no undue hazard. If, however, residues greatly in excess of the anticipated or safe level were encountered in large-scale or semi-commercial treatments, the product in question should be withheld from the market and not used for human or animal foods.

"The proposed procedure would permit the earlier safe development of a pesticide because voluminous data not otherwise obtainable could then be accumulated during the period in which final detailed toxicological studies are being conducted to develop more precise chronic toxicity data on which ultimate safe residue levels for the crop as a whole could be based."

Rep. Miller Calls Meeting

Another associated development in mid-February came in the form of a meeting called by Rep. A. L. Miller of Nebraska at which possible new legislation to require pretesting of pesticides was discussed with a group of representatives of the food and chemical industries. The meeting was called to obtain sugges-

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No matter what may be the need in the field of insecticides, Thompson-Hayward has a formula for it. So estimate now what your needs will be — and let us fill your order in advance of the seasonal rush!

Tri-6 WE 10

For control of corn root worm, spittle bug and wire worm. Contains one pound gamma BHC per gal.

Ded-Tox WE 25

For control of bollworm, pink bollworm on cotton, and cornborer in corn. Contains 2 pounds DDT per gallon.

Phenacide Dust #20

For cotton boll weevil. Contains toxaphene. Cotton treated with Phenacide dust produces large majority of bolls to mature stages.

Toxichlor Dust #5

For cutworms. Contains chlordane, powerful soil insect killer. Poisons cutworms three ways when worked into soil. Low toxicity.

Phosfume WE-25

For green bugs. Contains Parathion (25%). One application usually controls infestation in oats, wheat, barley. Also kills aphids, corn borers. Requires familiarity for handling.

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tions from industry on what provisions it would be practicable and desirable to include in such legislation. Mr. Miller indicated that he did not have in mind covering the whole problem of chemical additives in a single bill, but rather would probably offer three measures,—one covering foods, another cosmetics, and a third on pesticides. He listed the following as principles on which he believes such legislation should be based:

1. That the problem of controlling the use of chemicals in foods should be approached from the angle of protection of public health. He said he knew that some people believed it should also be considered on an economic basis, but he thought a first approach should be from the standpoint of public health protection.

2. The Food and Drug Administration should be given a reasonable time in which to make its findings, either sixty, ninety or 180 days from the date of filing of an application for permission to use a new chemical in foods.

3. There should be the right of appeal from the findings, either to a panel of experts, to the courts, or to both.

4. The burden of proof should be on the manufacturer or user to show that the chemical is safe as used.

•

New Seed Protectant

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that its new insecticide-fungicide product will be available to growers for the 1953 season. The material is said to provide protection for the seed against soil-borne diseases and also from soil insects which attack seed and young plants.

The blending of the two chemicals for plant protection resulted from tests conducted over the past several years, both by Du Pont investigators and by agricultural experiment stations in a number of states. New York experiments have shown that seed corn maggot could be controlled by treating bean seed with any of several insecticides. California investigations with lima beans showed good control of both wireworms and seed maggot when one of the insecticides, lindane, was used. Work in the control of various corn rootworms has been carried on in Iowa, North Carolina, and Louisiana. Other soil pests have been controlled through seed treatment in Pennsylvania and New Jersey experiments.

To provide growers with the proper blend of chemicals to do this double-duty seed treatment job, Du Pont has combined a new dustless formulation of "Arasan" with lindane under the name of "Du Pont I & D" (insect and disease) Seed Protectant. Small quantities of seed may be treated by hand, or large amounts may be treated with slurry treating equipment.

The new seed treatment material is recommended for use on corn and beans in many areas where both disease and insect onslaught have prevented growers from getting consistently good stands of these crops. It is also being tested for other use.

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1 lb. cans packed 48 in steel strapped cartons palletized, approximately 30 cartons on each pallet. Carton weight gross, 60 lbs.; net, 48 lbs.; legal weight, 56.2 lbs.; cubic measurements, 1.17 cu. ft.

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Direct all inquiries to:

EDCO CORP.

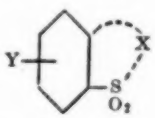
Elkton, Md. **United States of America**

Cables: "Edco", Elkton

INDUSTRY Patents

2,624,663. Composition for Treating Plants. Patent issued January 6, 1953, to Anthony T. Centanni, Philadelphia, Pa. A composition of the character described for treating plants, comprising five parts methenamine, ten parts sodium phosphate, one part ammonium chloride and one-fourth part iron oxide, said composition having a pH of seven, plus.

2,624,664. Herbicides. Patent issued January 6, 1953, to David T. Mowry and Arthur H. Schlesinger, Dayton, Ohio, assignors to Monsanto Chemical Co., St. Louis, Mo. A method for the destruction of plants which comprises applying to said plants a toxic quantity of a herbicidal composition comprising a carrier and, as the active ingredient, a compound having the formula in which



Y is a member of the group consisting of hydrogen and the nitro group and X represents a bivalent radical necessary to complete a five-membered ring and selected from the class consisting of where-

in R is a member of the group consisting of hydrogen, chlorine and bromine.

2,624,665. Herbicidal Composition. Patent issued January 6, to Arthur H. Schlesinger, Dayton, Ohio, assignor to Monsanto Chemical Co., St. Louis, Mo. A herbicidal composition comprising an oil-in-water emulsion of dibenzothiophene-5-monoxide.

2,625,666. Herbicidal Composition. Patent issued January 6, 1953, to Milton Kosmin and Arthur H. Schlesinger, Dayton, Ohio, assignors to Monsanto Chemical Co., St. Louis, Mo. A herbicidal composition comprising an oil-in-water emulsion of bis (trichloromethyl) sulfone.

2,626,211. Weed Killer. Patent issued to Frank J. Sowa, Cranford, N. J. The method of killing weeds which comprises the step of applying thereto an aqueous solution containing from about 0.10 to 10% by weight of monoammino boron trifluoride at the rate of about 16 gallons of solution per 1,000 square feet.

2,626,212. Selective Herbicidal Composition. Patent issued to Frank J. Sowa, Cranford, N. J. An herbicidal composition comprising as active ingredients from 1 to 50 parts by weight of an ammonia-boron fluoride compound selected from the group consisting of monoammino boron trifluoride and ammonium fluoborate and from 1 to 30 parts by weight of a chloro phenoxy acetic acid compound selected from the group consisting of the ammonium and amine salts and the esters of 2,4-dichloro phenoxy acetic acid and 2,4,5-trichloro phenoxy acetic acid together with a wetting agent which is compatible in aqueous solution with said ingredients.

2,624,479. Vibrator for Discharging Hopper Bottom Containers. Patent issued January 6, 1953, to Albert Musschoot, Park Ridge, Ill. and Charles M. Young, Jr., Philadelphia, assignors to Link-Belt Co. A vibrator for discharging hopper bottom discharge containers, comprising a bridge, means on the bottom of said bridge at each end portion thereof for supporting the bridge on the tops of the sides of the container to be discharged, said bridge being adapted to pivot about the extremities of the supporting means at one side of the bridge for delivering impact blows through the supporting means at the other side of the bridge, an unbalanced shaft rotatably mounted longitudinally of said bridge at the side which delivers said impact blows, said shaft of percussion relative to the pivotal extremities of said supporting means, a motor support pivotally connected at one of its end portions to the impact delivering side of said bridge, resilient means connecting the other end portion of said motor support to the pivotal side of said bridge for limited movement relative to the latter, a motor mounted on the resiliently connected end portion of said motor support, and means drivingly connecting said motor and said shaft for rotating said shaft to cause the unbalanced condition of the shaft to effect said pivotal movement of the bridge for delivering said impact blows, the line of force of said impact blows passing substantially through the impact delivering portion of said supporting means and the axis of said shaft.

2,624,662. Herbicidal Compositions. Patent issued January 6, 1953, to Floyd B. Erickson and Arthur H. Schlesinger, Dayton, Ohio, assignors to Monsanto Chemical Co., St. Louis, Mo. A herbicidal composition comprising an oil-in-water emulsion of a fluorine-substituted diphenyl sulfone, said sulfone being present in said plant emulsion in a quantity which is toxic to plant life.

2,625,471. Fertilizing Compositions. Patent issued to David T. Mowry and Ross M. Hedrick, Dayton, Ohio, assignors to Monsanto Chemical Co., St. Louis. A soil conditioning fertilizer which comprises a mixture of a finely divided flowable solid plant nutrient and a finely divided solid synthetic polymeric water-soluble polyelectrolyte having a molecular weight such as to improve the water-stability of aggregates in said soil, said polyelectrolyte being derived substantially entirely by olefinic polymerization.

2,625,529. Method of Conditioning Soils. Patent issued to Ross M. Hedrick and David T. Mowry, Dayton, Ohio, assignors to Monsanto Chemical Co., St. Louis, Mo. The method of improving the tilth of surface soils normally subject to slaking or erosion, which comprises incorporating in the soil in the presence of soil moisture from 0.001 to 2.0 per cent based on said soil of a synthetic water-soluble polyelectrolyte having a weight average molecular weight of at least 10,000 and having a structure derived by the polymerization of at least one monoolefinic compound through the aliphatic unsaturated group, said structure being substantially free of cross-linking.

2,626,769. Airplane Insecticide Spraying and Dusting Apparatus. Patent issued to Frank J. Wadman, Yakima, Washington. In an airplane including a fuselage having a material distributing device arranged longitudinally of said fuselage and dependingly supported from the latter, hopper positioned above and spaced from said distributing device for the reception of a powdered insecticide therein, a vertically disposed throat member rectangular in cross section interposed between said distributing device and said hopper and having one end in communication with said distributing device and having the other end in communication with said hopper, agitating means arranged transversely of said throat member adjacent the point of communication with said distributing device and rotatably mounted on said throat member, and power means operatively connected to said agitating means for effecting rotation of the latter to thereby keep said powdered insecticide in a loosened condition as it gravitates downwardly for distribution by said distributing device, said agitating means comprising a horizontally disposed shaft extending between the end walls of said throat member and rotatably journaled therebetween, a first group of spaced main agitating teeth disposed transversely of and projecting from said shaft contiguous to one side thereof and having one end secured thereto and having the other end terminating contiguous to and spaced from the adjacent side wall of said throat member, a second group of spaced main agitating teeth disposed transversely of and projecting from said shaft contiguous to

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There are many other CRAG Agricultural Chemicals in use today. CRAG Fly Repellent protects dairy cattle from biting flies. The insecticide, allethrin, is used in household aerosols and in space and dairy sprays. CRAG Fungicide 658 is widely used for disease control on citrus, potatoes, tomatoes, cucurbits, and peanuts. CRAG Turf Fungicide 531 is used by greenkeepers to control dollar spot and other turf diseases.

Many more Agricultural Chemicals are being tested now at State and Federal Experiment Stations, and by Carbide's staff of research workers. These, as well as the ones now in grower use, are the results of a continuous search for new and better chemical aids for the farmer.

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the other side thereof and having one end secured thereto and having the other end terminating contiguous to and spaced from the other side wall of said throat member, and an auxiliary agitating tooth interposed between adjacent main agitating teeth of said first and second groups and each having one end secured to said shaft and having the other end terminating contiguous to and spaced inwardly of said other ends of said main agitating teeth.

2,626,862. METHOD OF KILLING PLANTS. Patent issued to Percy W. Zimmerman and Albert E. Hitchcock, Yonkers, N. Y., assignors to Boyce Thompson Institute for Plant Research, Yonkers, N. Y. The method of suppressing the growth of plants which comprises applying to the plant a composition comprising undecylenic acid dispersed in water at a concentration of from 0.3% to 10%.

Trade Mark Applications

The following trade marks were published in recent issues of the Official Gazette of the U. S. Patent Office under the provisions of the Trade Mark Act of 1946. Any person who believes he would be damaged by the registration of any of these marks may, within 30 days after publication in the Official Gazette, file an opposition, or, if the 30-day period for filing an opposition has passed, petition for cancellation of the resultant registration may be filed.

Upon request, the publishers will be glad to furnish interested subscribers with a free copy of a booklet, "Trade Marks and Registration under the New Trade Mark Law." Address such request to Agricultural Chemicals, 175 Fifth Avenue, New York 10, N. Y.

GREEN GRO, in sans serif capital letters, for fertilizer. Filed June 5, 1951, by Eastern States Soilbuilders, Inc., Sharpsburg, Md. Claims use since Jan. 1, 1951.

ONE PLANT PLATE, devised in the in the form of a figure one, with "plant plate" below, for insecticide and fungicide having incidental properties as a fertilizer. Filed May 22, 1952, by Milligan Bros., Jefferson, Iowa. Claims use since Sept. 21, 1951.

LETTER "V", with elongated serifs extending horizontally outward from the upper end of each side of the letter, for veterinary insecticides, namely, insecticides, powder, preparations of rotenone and other ether soluble cube root extractives. Filed Sept. 22, 1951, by Armour & Co., Chicago, Ill. Claims use since Feb. 27, 1948.

PENTA WR, in bold-face letters, for toxic chemical used as preservative for wood products. Filed Jan. 22, 1951, by Chapman Chemical Co., Memphis, Tenn. Claims use since Apr. 24, 1950.

MORTALIN, in heavy capital letters, for rat poison. Filed Apr. 24, 1951, by A. S. Mortalin, Haslev, Denmark. Claims ownership of Danish registration No. 703.

UNEK, in capital letters, with accent over letter "e," for chemicals for destroying insects, pests and rodents. Filed Feb. 8, 1952, by Unek Products Co., Inc., Oconomowoc, Wis. Claims use since on or about Nov. 16, 1951.

MALAPHOS, in heavy capital letters, for insecticides. Filed July 26, 1952, by Eston Chemicals, Inc., Los Angeles, Calif. Claims use since May 26, 1952.

HY-LINE, in sans serif capital letters, for insecticides and disinfectants. Filed April 25, 1952, by Pioneer Hi-Bred Corn Co., Des Moines, Iowa. Claims use since Dec. 19, 1949.

LEAFFALL, in sans serif capital letters, for defoliants. Filed Aug. 24, 1951, by Food Machinery and Chemical Corp., San Jose, Calif. Claims use since July 12, 1951.

KILCOP "53" in capital letters, for fungicide. Filed Feb. 9, 1952, by Kilgore Seed Co., Plant City, Fla. Claims use since September, 1951.

EB-7, in heavy capital letters, for fumigant. Filed July 13, 1951, by Dow Chemical Co., Midland, Michigan. Claims use since June 19, 1951.

EB-20, in heavy capital letters, for fumigant. Filed July 13, 1951, by Dow Chemical Co., Midland, Mich. Claims use since June 19, 1951.

LETTER "V" imprinted over solid circle, with space reserved for lettering, for insecticides and fungicides generally, and specifically for those generically known as chlordane, heptachlor, dieldrin and aldrin, and compositions containing chlordane, heptachlor, dieldrin or aldrin. Filed June 26, 1952 by Velsicol Corporation, Chicago, Ill. Claims use since June 20, 1952.

SUFFO, in sans serif capital letters, for pesticides. Filed May 16, 1952, by Michigan Chemical Corp., Saint Louis, Mich. Claims use since July 1, 1946.

GOLDEN HARVEST, in hand-lettered script, for soybean defoliant, including pentachlorophenol and petroleum hydrocarbons. Filed Aug. 25, 1952, by Chapman Chemical Co., Memphis, Tenn. Claims use since July 17, 1951.

S.E.X., in Stymie bold face capitals, for cotton defoliant. Field Aug. 8, 1952, by Stauffer Chemical Co., San Francisco, Calif. Claims use since July 31, 1952.

KNOX-EM-KOLD, in capital letters, for insecticides and for a cattle-spraying compound. Filed July 18, 1952, by Nourse Oil Co., Kansas City, Mo. Claims use since Sept. 1, 1931.

FAMILY FARMER, in script type on two lines, with a circular motif of plow and rake at left, for fertilizer. Filed July 2, 1951, by Farmers Educational and Cooperative Union of America, Denver, Colo. Claims use since June 9, 1951.

Red and black striped circle, with space for letters, for fertilizers. Filed Apr. 16, 1952, by Davison Chemical Corp., Baltimore, Md. Claims use since September, 1945.

DAVCO, in capital letters in top half of circle, for fertilizers. Filed April 16, 1952, by Davison Chemical Corp., Baltimore, Md. Claims use since September, 1945.

DAVCO, in black capital letters, for fertilizers. Filed Apr. 16, 1952, by Davison Chemical Corp., Baltimore, Md. Claims use since 1936.

GREEN FROG PLANT FOOD—Makes Plants Jump. Words "Green Frog" in hand-lettered capitals with drawing of frog between words. Remainder of trade mark in capitals and lower case, for fertilizer for plants and shrubbery. Filed Apr. 3, 1952, by William H. Smith, Baltimore, Md. Claims use since Feb. 7, 1952.

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Sprayer Mfgrs. Optimistic

That the agricultural sprayer and duster equipment trade is in a healthy state was noted at the recent quarterly meeting of the National Sprayer and Duster Association in Chicago. Present demand for such equipment warrants continued expansion of the $80 million a year industry, it was indicated.

R. B. Chapin, Batavia, N.Y., president of the Association, outlined reasons for the optimistic outlook. He said that indications point to heavier populations of insects; and the demand is for greater agricultural production to keep pace with increasing population in the U.S., reported to be expanding at the rate of 7,000 a day. Since no significant amount of new land is available for agricultural production, it becomes necessary to get larger returns from that now under cultivation, Mr. Chapin reasoned. "This requires farmers to step up their 'hot war' on insects, weeds and plant diseases through the use of insecticides and herbicides," he said. It follows, that more equipment will be needed to apply these materials.

The rising cost of crop and livestock production is making growers more careful and selective in their purchases for production, it was pointed out. Since they must buy equipment which will give them maximum results, they are willing to spend adequately for means to check losses from insects, weeds and crop diseases.

"A farmer just can't afford to put his money into seed, machinery and labor if the bugs are going to reap the harvest," said Mr. Chapin. "On the other hand, reduction of these losses to a minimum can go far

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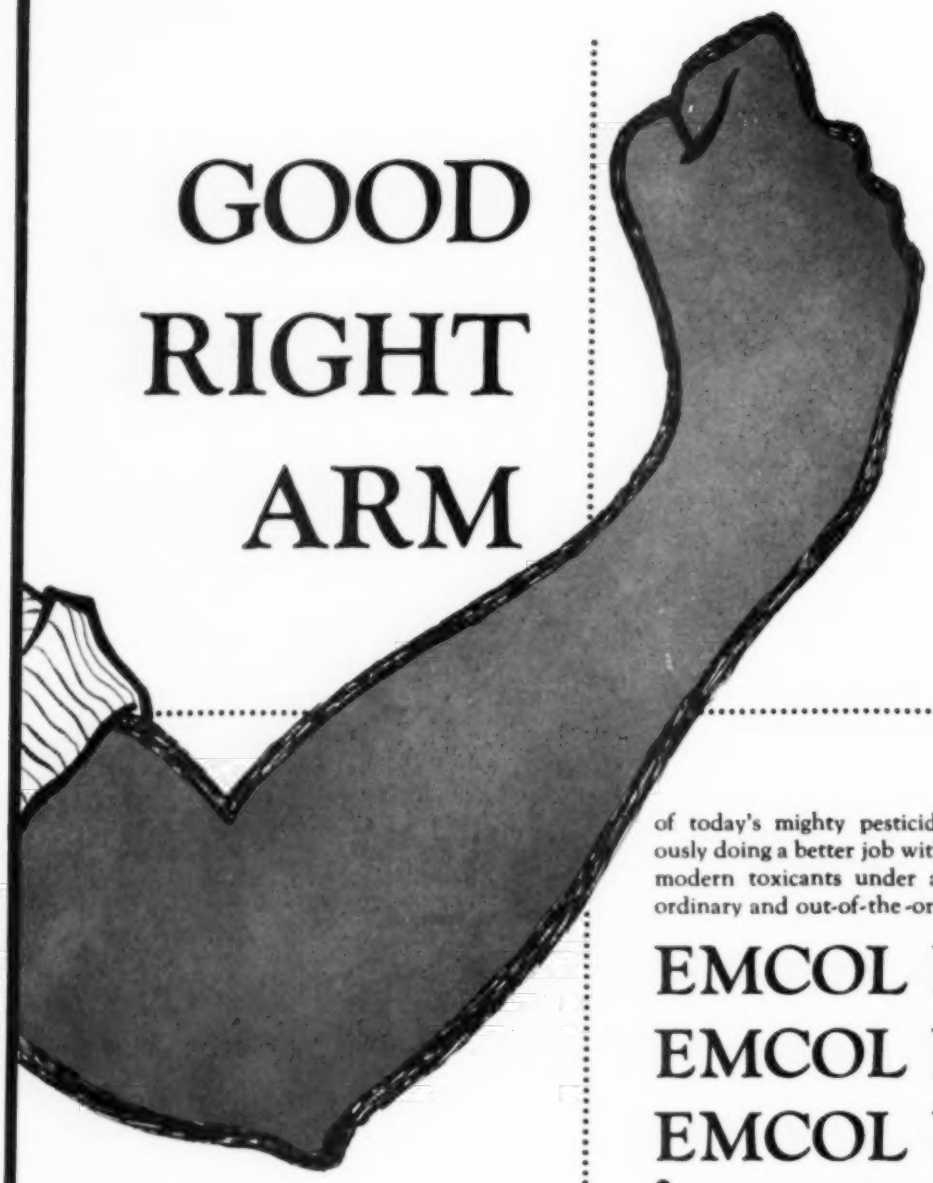

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toward sustaining farm income in a period of declining prices."

The present level of farm income appears high enough to insure a good market for spraying and dusting equipment, according to reports made to the Association. Speakers noted that the total farm debt is estimated at $14,149,000,000 in latest Department of Agriculture figures. Total agricultural assets at the same time are $168,964,000,000. A debt of this size, slightly more than 8 per cent, is insignificant as compared with the debts of most business. The farm sprayer and duster equipment market is, in their opinion, in a healthy state.

•

Ky. Plant Nearly Ready

April 15 is the date set for completion of the new mixed fertilizer plant being built at Louisville Ky. by Southern States Cooperative. According to the building schedule, machinery was to arrive in February and would be completely installed by the middle of April.

The plant will have an annual production capacity of about 40,000 tons, S.S.C. says. Its cost will be about $400,000, including land, buildings and machinery. The building is of one-story construction except for the headhouses for elevators and machinery which are about 60 feet high. The building will be 120 feet wide and 350 feet long, containing one fertilizer manufacturing or mixing mill and two bagging mills. Storage space will be provided for curing of at least 9,200 tons of fertilizer at once. Storage space for 3,200 tons of raw materials will also be provided in the new structure.

•

Hits TVA's Distribution

An investigation into the policies and practices employed by the Tennessee Valley Authority in the distribution of fertilizers made by the TVA was called for last month in Congress by Rep. E. C. Gathings of Arkansas, Democratic member of the House Committee on Agriculture. Steps should be taken, Rep. Gathings indicated, to bring about a wider distribution of TVA fertilizer so that a greater number of farmers can benefit from the TVA program. In his opinion, there is no valid reason why TVA should confine its sale of fertilizer to pasture usages only. It is as essential to the country to grow row crops, he argued, as to overdo pasture land and cattle raising.

Pointing out that the TVA is supported by all the taxpayers, Rep. Gathings protested against limiting distribution of TVA products to any one segment of the farm population, or confining present experimental and educational programs to any specific geographical areas. The outlets now used by TVA are furnished with several thousand tons of ammonium nitrate and triple super, Mr. Gathings emphasized, quite a large quantity of materials to be used on a strictly experimental or educational program.

He also offered other critical comments on fertilizer labeling, indicating that regulations might be

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desirable to require fertilizer shippers to show the type of nitrogen going into their products. There is quite a difference in the chemical action of the various sources of nitrogen, he reminded, and packers should be required to show whether their nitrogen is derived from ammonium nitrate, sulphate of ammonia, nitrate of soda or from some other form of synthetic nitrogen.

•

Ala. Conference Feb. 23-25

The annual Pest Control Conference was to be held at Auburn, Ala., Feb. 23-25, according to Dr. E. V. Smith, dean and director of A.P.I. School of Agriculture and Agricultural Experiment Station.

The first day marked the seventh workshop for state plant inspectors and was concerned chiefly with problems pertaining to ornamentals and sweetpotatoes.

The last two days featured a conference of custom applicators, and pesticide manufacturers and distributors, dealing with new developments in fungicides and insecticides with emphasis on aerial application, Dr. Smith says.

Participating with the Agricultural Experiment Station in the three-day program were the Division of Plant Industry of the State Department of Agriculture and Industries, State Department of Aeronautics, Alabama Flying Farmers Association, and pesticide manufacturers and distributors.

The committee on program and arrangements included B. P. Livingston, chief, plant industry division, State Department of Agriculture; L. H. Smith, Opelika, representing the Alabama Flying Farmers Association; Asa Rountree, Jr., director, State Department of Aeronautics; Robert G. Pitts, director of Auburn School of Aviation; J. A. Lyle, chairman ,W. G. Eden, Chas. F. Simmons, L. M. Ware, F. A. Kumer, and E. W. Johnson of the experiment station staff.

Attending the conference were plant inspectors, aerial applicators, representatives of insecticide and fungicide manufacturers, distributors, and professional workers and specialists in the fields.

•

Elected to Bemis Board

At the 1953 annual meetings of stockholders and the board of directors of Bemis Bro. Bag Co., F. V. Deaderick was elected to membership on the board. Mr. Deaderick is also a vice-president and the director of eastern operations for the Bemis company.

Joining Bemis at St. Louis in 1918, Mr. Deaderick was a salesman and later office manager until his appointment as manager at Houston in 1927. He became eastern director of sales with headquarters in New York in 1951, and this responsibility was widened in 1952 when he became director of eastern operations. He was also elected vice-president in 1952.

The board also named R. Ramsay secretary and comptroller and David M. Finley, assistant secretary and assistant comptroller.

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ORTHO

Carew Swears Off Comedy; Finds "Erunam" Raises "Knits"* in Trade

JOHN Carew, Associate Professor of Vegetable Crops, Cornell University, Ithaca, N. Y., swears that from here on, he'll be very careful about inserting humorous material in the *Cornell Veg-News*, a bulletin sent twice a month to county agricultural agents.

Last July, the bulletin carried a straight-faced "news" item, heralding a new fertilizer material, "ERUNAM," which the heading indicated "can be your'n for the asking." The item described the material in considerable detail, even going so far as to declare that "Most of the world's leading experiment stations are full of Erunam".

Now, some seven months later, Mr. Carew is still getting reactions from this little gem, and he is getting to the point of being really puzzled at the way many of his readers took the idea seriously. He reports that when he wrote the piece on "Erunam," he intended only to satirize some of the fantastic claims being made at that time in popular magazines and newspapers, concerning soil conditioners and other "miracle" products. "I thought at the time I was being sufficiently sarcastic and that my readers would get the meaning," he laments.

But the fact is, that Mr. Carew now has on file at least 30 bonafide requests for trial samples of "Erunam"; also several letters containing remarks complimenting the University on the development of this "fine new product"; and clippings to indicate that the article has been reprinted in several nationally-distributed magazines, two state garden papers and several newspapers.

Although our subscribers have heard of this before, we thought many would like to see the original masterpiece in its entirety in order to review it in the light of Mr. Carew's late experiences. (*Agricultural Chemicals* readers please note; the following is NOT to be taken seriously!)

Erunam can be Your'n for the Asking

Public demand forces us to release our revolutionary new garden product, ERUNAM, (pronounced AIR-OO-NAM). ERUNAM is not just an inert soil conditioner. ERUNAM is not only a miracle type plant food. ERUNAM is everything! One heaping glob of our magic atomic substance will remake your garden. ERUNAM makes light soils heavy, heavy soils light and steadfastly ignores the medium soils. ERUNAM is a selective pesticide: it kills harmful weeds, bugs and diseases while fraternizing with the approved ones. Better yet, ERUNAM has the Good Worm-keeping Seal of approval. ERUNAM contains decomposed chlorophyll; your garden will never smell the same. ERUNAM contains no nasty chemicals; it's purely organic. One pound of this concentrated product is equivalent to 16 ounces. Most of the world's leading experiment stations are full of ERUNAM.

Write for our trial garden size bucket today. Offer limited to county agents only.

Remember ———— ERUNAM spelled backwards is ————

* "Knits" spelled backwards, is .....

ECONOMY IN PRIMARY GRINDS? HOW?

More and more formulators are learning the money-saving advantages of using Barden Clay in dust bases and wettable powders. Because Barden is highly *adsorptive*, more of the toxicant is carried on the *surface* of the clay particle than with other commonly used absorptive diluents. All of the toxicant is readily available for action.

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✓	Improved dispersion
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For Dust or Spray... use Barden Clay— the Low-Cost Scientific Diluent

SYSTOX*

has a common name "demeton"

SYSTOX is Chemagro's trademark name for a formulation of 0, 0-diethyl-0-2-(ethylmercapto)-ethyl thiophosphate, the remarkably effective systemic insecticide which was developed by Farbenfabriken Bayer, the inventor of parathion, and which Chemagro is licensed to manufacture in this country.

To make it easier for the many scientists who are experimenting with SYSTOX and who do not like to incorporate trademark names in their reports, the common name "demeton" is being used by Chemagro to designate the active ingredient of SYSTOX.

Chemagro therefore respectfully suggests the use of the common name "demeton" in scientific reports, rather than the use of the commercial trademark SYSTOX. If the word SYSTOX is so used, we request that a statement be included to the effect that it is a trademark of Chemagro Corporation.

We wish also to express our deep appreciation to the many agricultural scientists who are continuing to test demeton, and whose findings to date indicate that demeton is a revolutionary insecticide of great economic importance.

* REGISTERED TRADEMARK OF CHEMAGRO CORPORATION

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Hedrick Honored

Mel Hedrick, connected with the Dayton laboratories of Monsanto Chemical Company and one of the Monsanto chemists largely responsible for the development of "Krilium," has been named one of the ten outstanding young men of 1952 by the U. S. Junior Chamber of Commerce. Young Hedrick, who spent his childhood in West Salem, Illinois, attended Indiana University and joined Monsanto in October, 1947, following graduation.

It was about a year later that he started working on a twin project in agricultural chemicals under group leader, David Mowry. He started initially working on both herbicides and soil conditioners. Soon, they found that they were making so much progress with the soil conditioner program, that they were forced to devote 100% of their time to this part of the work. Then, in December, 1951, the result of the experiments was announced . . . "Krilium."

FERTILIZER USE

(*Continued from Page 49*)

For the North Central regions, their rate of increase was greater from 1942-43 to 1945-46, reaching 23.3 percent. From 1945-46, their rate of increase was downward until in 1949-50 consumption was 3.4 percent less than for the preceding year. A rapid recovery was made in 1950-51 when consumption was 18.6 percent greater than for the preceding year but dropped to an increase of 14.9 percent in 1951-52. The average rate for the South Central regions has ranged between 19.0 and 0.9 percent. High increases and low increases have usually occurred in alternate years. The widest range of rate of change has occurred for the Mountain and Pacific regions. Their rates have varied between an increase of 72.0 percent to a decrease of 9.3 percent.

In general, the rate of change in the use of fertilizer showed an upward trend from 1942-43 to 1945-46. From 1945-46 to 1949-50, the rate was downward, reaching a low in 1949-50, when consumption was 1.1 percent less than for the preceding year. The rate turned upward in 1950-51 when consumption was 14.4 percent greater than the preceding year and downward in 1951-52 when consumption was but 6.8 percent more than in 1950-51.★★

NEW ORLEANS PLANT

(*Continued from Page 62*)

in Kansas City, a complete laboratory staffed by qualified chemists has been established in the New Orleans plant to control such formulation problems as particle size, dustability, wettability, emulsification, stability, and many of the other ramifications in the formulating industry.

With both their technical and sales staffs working in close cooperation with the research and service agencies of the south, Thompson-Hayward indicates that it is now in a position to service this area with a minimum of time consumed for formulation and transportation.

Formulators—

Are you sharing in the Big, New Market for

SOIL CONDITIONERS

which the Federal Trade Commission has predicted may reach $15,000,000 in 1953?

POLY-ACK, an acrylic soil conditioner, (20% solution of sodium polyacrylate) is available in bulk — drums or tank cars — for repackaging by formulators and distributors.

Offer your trade the *original* soil conditioning concentrate — POLY-ACK.

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Are wheat insects causing crop losses? Then Colorado .44 Chlordane, with its "triple killing action" is for you. Chlordane assures high death rate for pests in the shortest possible time, because it kills three ways: 1) by vapor, 2) stomach poison, 3) contact. Colorado .44 Chlordane is highly recommended for use in municipal sanitation, because of its deadliness against cockroaches, disease carrying flies, mosquitoes, and mange on hogs. Also effective against ants, crickets, centipedes, scorpions, silverfish and black widow spiders.

BOLL WEEVILS

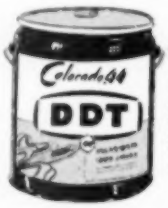
When crop insurance against the Boll Weevil is needed, use Colorado .44 Toxaphene. Toxaphene is recommended by the U. S. Department of Agriculture for use against the grasshopper too. Get Colorado .44 Toxaphene now, for use against boll worms, cotton aphid, cotton leafworm, as well as the Boll Weevil and Grasshopper.

WEEDS

Colorado .44's 2-4D Esters and Amines, and 2,4,5-T are recommended for elimination of brush and weeds, which rob crops of moisture, vital minerals, plant foods and sunlight. Selective weed killers give effective control at minimum cost and labor. Eliminates cockleburr, dandelion, mustard, plantain, ragweed, pigweed, sow thistle, bindweed and other troublesome weeds in small grains, flaxes, lawns, pastures, corn and grass seed crops.

LIVESTOCK PESTS

Are livestock losses from ticks, lice and flies causing extra work and weight losses? If so, then the solution to your problem is Colorado .44 Gold Star Livestock and Barn Concentrate. Adds pounds to your cattle and other livestock by eliminating the annoyance of weight reducing pests. Colorado .44 Gold Star is also recommended as residual control in and around barns.



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Limitations of Sprays and Dusts Partly Overcome by Application of

Granular Insecticides

By M. D. Farrar

Entomologist, S. Carolina Experiment Station
Clemson, S. C.

GRANULAR formulations of insecticides have been developed over recent years in an attempt to overcome some of the limitations of sprays and dusts, substantial portions of which are necessarily lost through drift in conventional methods of aerial or ground application. This method of application of granular insecticides to the soil, in addition to the advantage of minimizing loss through drift, also offers the advantage of providing a means of controlling insects which attack the parts of the plants growing below the soil surface.

Mixing With Fertilizers

MIXING insecticides with fertilizers has been advanced as a practical means of placing insecticides in the soil without undue loss. Although mechanically satisfactory, mixtures have been unpopular for many reasons. Among these are the difficulties of administering the fertilizer laws covering grades and registration, labeling and manufacture, and the distribution of the required mixtures. Certain states have prohibited the mixing of insecticides with fertilizers; others will permit the manufacture and sale of such a mixture only if a special tag is attached to each bag. In spite of these handicaps, thousands of tons of fertilizer-insecticide mixtures have been manufactured and sold.

Now granular insecticide formulations have been developed to meet this problem. With this type of insecticide available, farmers can purchase an insecticide for use on soil in a bag carrying a registered insecticide label. This can be applied either alone or with fertilizers in any proportion considered desirable. The amount of insecticide and method of application will depend of course on the kind of insects and the dosage recommended.

There are many materials that may be used as bases for granular insecticides. Among these are common clays, highly absorptive clays, bentonite, tobacco by-products and perhaps many others. The selection of the

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HERBICIDES

NOW AVAILABLE IN BULK

a-Napthaleneacetic Acid

a-Naphthaleneacetic Acid, Methyl Ester

b-Naphthoxyacetic Acid

Sodium a-Naphthaleneacetate

Sodium b-Naphthoxyacetic Acid

Trichlorophenoxyacetic Acid

Trichlorophenoxypropionic Acid

Your inquiries for these and other products are invited. Our facilities and services are available for contract manufacturing on a confidential basis.

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"We believe that if agriculture is going to meet the emergency needs of the defense program, it will require an additional 500,000 tons of nitrogen fertilizer."

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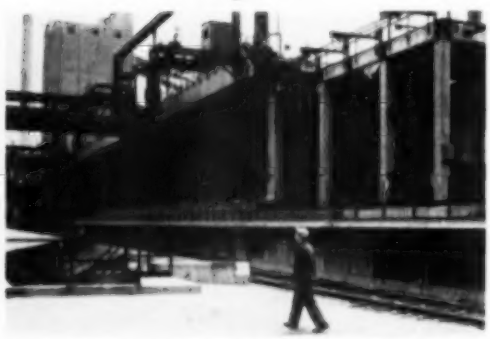
A reliable large-tonnage producer of top-analysis Ammonium Sulphate...



From new modern Republic coke ovens like these will come additional tonnages of top-quality Republic Ammonium Sulphate.

Part of Republic Steel's present $450,000,000 expansion program includes new coke ovens to feed coke to additional blast furnaces.

And from these new, modern coke ovens, you now will be able to get regular shipments of top-analysis Ammonium Sulphate for your fertilizer blends.

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Republic AMMONIUM SULPHATE

proper base depends on what may be required of the finished product, how it is to be applied, and other related factors. The amount of chemical toxicant absorbed will depend on the physical properties of each inert. To exceed the limit of absorption may produce a non-free flowing product. The lower economic limit of toxicants is about 5 per cent, with an upper limit of about 5 per cent. Good working percentages range between 5 and 25 per cent of toxicant to the inert carrier or base.

The distribution pattern of a granular type insecticide will depend on the physical properties of the inert. In this paper, the size of the particles termed granular inert, are those that pass through a 30-mesh screen, but are held on a 60-mesh screen, termed 30/60 grade. The size of each particle within this range will influence the total number of particles in a pound. It has been calculated that a typical pound sample of 30/60 mesh "Attaclay"* contains 13,500,000 particles. When scattered uniformly over an acre, each square foot would average 300 particles, a single square inch 2 plus particles. When calculated against applications of 5, 10, and 15 pounds per acre, the particles would be scattered at 10, 20, and 30 per square inch respectively. The individual particles would be about 2/10 inch apart when distributed at 30 per square inch.

It may be assumed that as the total pounds of granular insecticides per acre are increased, the individual particles will fall closer together. In the manufacture of granular insecticides, the total amount of inert base is impregnated with the insecticide. By reason of the laws of chance, each particle should carry an amount of toxicant in proportion to the size and distribution of that particle within the total mass. When scattered on the soil, as the number of particles are increased per unit of area, the distribution of toxicant would likewise be the same.

*Product of Attapulgus Minerals & Chemical Corp., Philadelphia.

Good Kill Recorded

IN two cases where one pound of technical heptachlor was applied per acre, certain Florida data gave a 96 per cent kill of sand fly larvae following an application of 5 per cent granular heptachlor at 20 pounds per acre; in comparison, only a 93 per cent kill was obtained following an application of 10 per cent granular heptachlor at 10 pounds per acre.

The amount of insecticide or toxicant that a granular inert will absorb has an important bearing on the formulation. This factor may vary between 5 and 50 per cent by weight; the objective being to have a finished product that will be free flowing without agitation.

The bulk-weight density of granular inerts may cover a wide range. In tests the most bulky product formulated is a by-product of tobacco manufacture. When formulated at 5 per cent concentration of toxicant, it flowed easily and could be

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COPPER SULPHATE
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BRAND
Copper Sulphates
for Sprays • Dusts • Fertilizers
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For over sixty years Triangle Brand Copper Sulphates in various forms have been the standard of quality for agricultural chemicals.
In the preparation of Bordeaux Mixture sprays the new method using Triangle Brand 'Instant' Copper Sulphate 99% pure has superseded the old formulations. Requiring no need of a stock solution, the "Instant" form may be added directly to a Chemically Hydrated lime which need not be slaked.
Dusts are most effective when prepared with Triangle Brand Basic Copper Sulphate and the proper diluent. No lime is necessary. Concentrations of from 7-10% copper can be maintained.
Fertilizers with Triangle Brand Copper Sulphate added in their formulation will provide the necessary amount of this element vital to better crops.
Triangle Brand Copper Sulphate is available in Large and Small Crystals, Superfine (new snow form), and the 'Instant' (powder) forms which contain 25.2% metallic copper. Triangle Brand Basic Copper Sulphate is available in powder form (average particle size is 2 microns) and contains 53% metallic copper.
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DOW

ESTERON TEN-TEN—AN IMPROVED, MORE EFFECTIVE 2,4-D WEED KILLER

DOW develops superior ester product for use in small grains

Farmers who have used or have merely considered using an ester formulation in small grains now have available an improved low-volatility ester weed killer in Esteron® Ten-Ten. Introduced last season—Esteron Ten-Ten is recognized as a great step forward in farm weed control—especially in increased effectiveness in controlling weeds which are sometimes hard to kill.

Here are several reasons why Esteron Ten-Ten offers a new high in weed control: It is more effective, particularly against tough herbaceous perennials and against certain annuals under unfavorable conditions of growth. It contains 70.8% propylene glycol butyl ether esters of 2,4-D (43.8% 2,4-D acid equivalent). Its low volatility reduces hazard to adjacent crops. It sprays easily in either hard or soft water and is adaptable to either low or high-volume equipment for air or ground application. It has excellent storage qualities—no settling out of active ingredients because of freezing or extended storage.

Dow sales and technical men are available to work with persons responsible for recommending agricultural chemicals. Call the nearest Dow sales office listed in your telephone directory or write to Midland. THE DOW CHEMICAL COMPANY, *Agricultural Chemical Department*, Midland, Michigan. In Canada: Dow Chemical of Canada, Limited, Toronto, Canada.

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DOW

handled by all types of equipment. Granular "Attaclay" and similar inerts will absorb up to 25 per cent of certain insecticides. Bentonite has the lowest absorption property of those inerts tested, ranging around 5 per cent. With the exception of granular tobacco by-products, all of the formulations tested have a tendency to pack.

In the manufacture of granular insecticides the valve packing equipment commonly used for dusts will fail, if the finished products exhibit a property of packing. This property also restricts to a certain extent the type of equipment used for distribution. The addition of a chemical to induce a flow property may correct this difficulty.

A satisfactory base for a granular insecticide should be closely screened for uniformity. An excess of fines will make a dusty formulation that defeats, in part, an important property of granular mixtures. A well formulated mixture will be free flowing and essentially free from dust. Such a mixture when applied, will show little tendency to drift, the particles falling directly to the soil. When scattered from altitudes exceeding 100 feet, some formulations may drift slightly with the wind.

Airplane Application

APPLICATION by airplane has been very satisfactory over difficult terrain, where the airplane is about the only economical method of applying insecticides. For this purpose, a high concentration of toxicant is desirable in order to increase the pay load. Amounts of 10 pounds per acre have been broadcast successfully from the air.

Only experimental flights of the granular formulations will determine the distribution pattern for each type. The heavier bulk density mixtures will give the lesser width of swath covered. In experiments a bentonite formulation flown at 70 feet covered a swath of 27 feet; an Attaclay formulation flown at 80 feet covered a swath width of 85 feet; a tobacco by-product formulation flown at 100 feet covered a swath width exceeding 100 feet.

With a Stearman plane, experience has shown the type of pattern that may be expected from a 16 per cent granular dieldrin formulated into 30/60 Attaclay. Experimental runs indicated that, flying at crop dusting height, this granular insecticide was scattered for the width of the wings or 42 feet. When flown from 80 feet, 85 feet of swath width was obtained.

For perfect coverage of the soil, the ship was flown at 85 to 100 feet of altitude following the usual wing width pattern of flight. A flagman stationed at both ends of the run insured a uniform flight pattern. Areas of land flown by this procedure had an essentially uniform distribution of particles on the soil irrespective of the overhead cover of trees, shrubs, grass, or crops.

Other than to disengage the agitator, no changes are necessary on an airplane equipped for dusting, in order to handle granulated insecticides. The flow properties of granu-

Go the scientific way...go **MGK**

AEROSOL INSECTICIDE CONCENTRATES

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lated mixtures are such that they will feed uniformly from an airplane. An experienced pilot can quickly learn the proper feed in accordance with the characteristic of his ship. A full pay load to the capacity of the ship may be carried on each trip.

Tractor driven row crop duster equipment may also be used to distribute granular insecticides. The packing characteristics of the material may stop the agitator on some equipment when the hopper is completely filled. Since no agitation is required other than to feed the unit, the agitator may be removed where it gives trouble. Several manufacturers are providing adjustments on their equipment to give less difficulty with this type of material. To obtain a maximum distribution, the nozzles must be operated at the highest level from the soil.

For small lots, a regular grass seeder may be used to cover several acres. For lawns and gardens, broadcasting by hand will give satisfaetory coverage. With a fertilizer attachment, the granulated insecticide may be mixed in the hopper with the fertilizer and applied along with it. The new type fertilizer spreaders work well for broadcasting granular insecticides either alone or mixed with fertilizer or soil lime.

The kinds of soil insects that may be controlled by the method are unlimited. The amount and kind of insecticide applied may be varied within wide limits to suit the particular insect problem.

In the case of late corn heavily infested with corn worm in the whorl stage, a single application of 5 per cent granular dieldrin or 25 per cent granular toxaphene eliminated the infestation completely within 48 hours. Good reports have been recorded on green June beetles in pastures; corn rootworms in corn and peanuts; sod webworms in pastures and lawns; chinch bugs in pastures and golf courses; ants in lawns; mosquitoes and sand flies in marshes; white-fringed beetles in cultivated and non-cultivated land; and cutworms in gardens and truck crops.

For treating soil, a higher per-

formance per unit of insecticide may be expected where the treatment is worked into the soil. Where the soil is not to be worked up after treatment, the amount applied should be doubled per unit of area treated. For pastures and non-cultivated land the following levels have been tried. Pounds of technical applied per acre, were as follows: aldrin 5; dieldrin 2½; heptachlor 3.75; chlordane 7; toxaphene 25; DDT 25; and parathion 1.

Granulated insecticides should not be confused with dusts in any sense. Under favorable conditions, the granular material does not adhere to foliage, but falls through the ground cover on to the soil surface. It should be considered as a means of applying known amounts of insecticides to the soil surface without undue loss of the chemical from drift. The physical charaeter of the product makes it one that may be handled in conventional farm machinery.

Summary: A granular insecticide may be any of the insecticides impregnated on to inerts of 30/60 mesh range in particle size. Equipment designed for applying conventional dusts may be used to apply granular insecticides with very little modification.

The formulation does not adhere to foliage, but penetrates heavy cover to fall on the surface of the soil. Where the formulation is adaptable, it offers promise in the control of many soil infesting insects and in other specialized problems.★★

•

Briggs Widow Dies

The widow of George C. Briggs, formerly vice-president of Armour Fertilizer Co., Atlanta, Ga., died February 11 in Atlanta.

LA. CONFERENCE

(Continued from Page 54)

was led by Neal Dry, county agent, Caddo Parish, on labeling of insecticides and education of retailers. Members of the panel were L. P. Harris, Cotton States Chemical Company; Ernest A. Epps, chemist, State Department of Agriculture; Albert Sidwell, Reasor-Hill Company; and J. J. Joyce, Jr., county agent, Ouachita Parish. Much interest was shown in this subject and it was pointed out that the labels are primarily for the protection of the users and that they conform to government regulations. The general trend of the discussion indicated a need for simplifying the labels and directions for use. It was suggested in addition to the percentages of active ingredients shown on the labels that the pounds of technical material per gallon should always be added.

Application Discussed

DR. CHAS. LINCOLN, Arkansas Experiment Station, led a panel discussion on the application of insecticides, including applicators and machinery. M. M. Hamner, Jr., commercial pilot, stressed the importance of accurate application by plane. R. C. Atkins, planter, from Bossier Parish, presented the farmer's view

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on the application of insecticides, and pointed out how they could assist applicators by removing trees, wires and other obstacles that interfere with the operation of planes. L. D. Newsom, Louisiana Experiment Station, stressed the importance of thorough application and stated that plane applications should always be accompanied by swath flagging on the ground. He pointed out that even distribution is very hard to obtain without proper flagging.

The second day of the conference opened with a panel discussion on the checking of cotton fields, led by K. L. Cockerham, Extension Entomologist of Louisiana. Others serving on this panel were Truman Thomas, Anti-Pest Company and Ralph Pennuel, Logan Seed Company, both of whom are commercial checkers, and Gordon Barnes, Extension Entomologist of Arkansas. It was stressed by all speakers on this panel that the checking of cotton fields is extremely important; that much of the insecticide is wasted if checking is not done and satisfactory insect control cannot be expected without an accurate and regular checking of fields to determine the species and abundance of the pests during the season.

A discussion of the research and control on cotton insects during 1952, led by C. E. Smith, Louisiana Agricultural Experiment Station, was one of the most important discussions at the conference. R. C. Gaines of the Bureau of Entomology and Plant Quarantine at Tallulah, Louisiana, reported on the research at that station during 1952 and John R. Rousell and L. D. Newsom reported on the work and recommendations at the Louisiana Experiment Station during the year. Dr. Charles Lincoln reported on recent work of the Arkansas Experiment Station. Changes in recommendations from preceding years were discussed and the revised recommendations for Louisiana for 1953 were distributed at this time.

The pink boll worm threat to Louisiana was discussed by S. J. McCrory, state entomologist and J. H. Williams, planter, Natchitoches, Louisiana. Both speakers stressed the

importance of the menace which now faces Louisiana since the pink boll worm was discovered in DeSota Parish in the fall of 1952. Regulations being applied to parishes in the western part of the state were explained.

One of the highlights of the conference was an address on the afternoon of the first day by H. C. Sanders, director of the Louisiana Agricultural Extension Service. Mr. Sanders said he recognized the importance of such meetings where entomologists and industry may discuss their common problems and cooperate more closely in the effort to control agricultural pests. He pointed out that while many farmers and livestockmen are using pest control, there are still many who are not, and that there is a fine opportunity to increase the effectiveness of the control efforts by reaching into these additional fields and extending the benefits of insect control to these additional thousands.★★

DEVELOPING CHEMICALS

(Continued from Page 44)

the structure of pyrethrins, the naturally-occurring effective compounds and later synthesized a relative, allethrin.

Assuming that effective compounds have been found in the initial screening work, the biologist must now supply the answers to such questions as: Which is the most promising member of the series? Which plants are sensitive, which resistant? What effects do temperature, soil type, rainfall, and humidity have? All of these questions can be answered more or less satisfactorily in the laboratory and greenhouse.

At this stage in the development of a chemical, chemists and engineers must begin to investigate the economics of production. What will be the cost per pound? How good is the process now used for making it? Can the process be improved? Are alternative processes possible, and if so, how do they compare? An economic investigation at this stage should influence the future of the chemical only within broad limits. It is undesirable to discard a chemical on too strict an economic basis at this time since the compound's usefulness and hence its selling price cannot be determined precisely as yet. Only those compounds that obviously will always cost more than they can be sold for should be discarded now.

Toxicologists must now conduct their usual preliminary tests such as acute oral toxicity, skin absorption, and eye irritation. This work may show that the compound is too hazardous for the use contemplated. Also, recommendations are necessary as to special precautions in further work with this compound. It is customary prior to this stage to handle all compounds as if they were extremely hazardous materials. Such precautionary measures are easily instituted in a single laboratory, but cannot be depended on where many different widely-scattered workers are investigating the material. The com-

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pound is now approaching that stage in development where more people will be testing it.

At this time it is necessary to initiate chemical stability tests. Shelf-life must be determined to ascertain whether the material can be held for several years. Do high storage temperatures deteriorate the chemical? If so, this limits the conditions under which it must be held. If light decomposes the product, it must not be packaged in clear glass even for experimental distribution. Further, if it is particularly susceptible to ultraviolet decomposition, it may not be usable under outdoor conditions. Dr. J. B. Harry's article in the February, 1953, issue of *Agicultural Chemicals* has detailed all the problems of formulation that must be considered. It is not necessary to review these again except to remember that they must be explored carefully at this stage of development.

Concurrently, patent proceedings should be carried on. The limits of the invention must be explored; the previous literature must be reviewed thoroughly and a patent application should be prepared and filed. Decisions must be made on what foreign coverage is desirable.

Presumably in some large-scale laboratory equipment, ten or more pounds of the chemical have been produced by now so that it may be tried on those crops in the field where initial work showed it to be promising. Also experiment station workers and research men in grower's organizations now should be considering its value in solving their own research problems.

If the chemical still looks interesting after all the foregoing work has been completed and interpreted, further and more detailed examination is in order.

The proposed process of manufacture must be studied carefully to determine the answers to such questions as: Will the reaction take place in iron equipment without either decreasing speed of reaction or corroding the iron? If iron is unsatisfactory, how about stainless steel or a half-dozen other commonly used alloys? Although one or another of these materials may be usable, it may be that glass-lined equipment would be best. What rate of production can be achieved, and what are the factors influencing this optimum rate? What purity can be reached economically, and what are the impurities? The biologist must learn what limits are tolerable on the various impurities from a performance standpoint. The answers to these questions are essential to sound design of a future plant to make the chemical.

What About the Market

MARKET analyses are necessary to show what the total potential market is and, in view of competition, what portion of this market can be expected to be captured. It is necessary also to estimate the rate of growth of sales so that production schedules can be planned intelligently. A determination must be made of the selling price at which the

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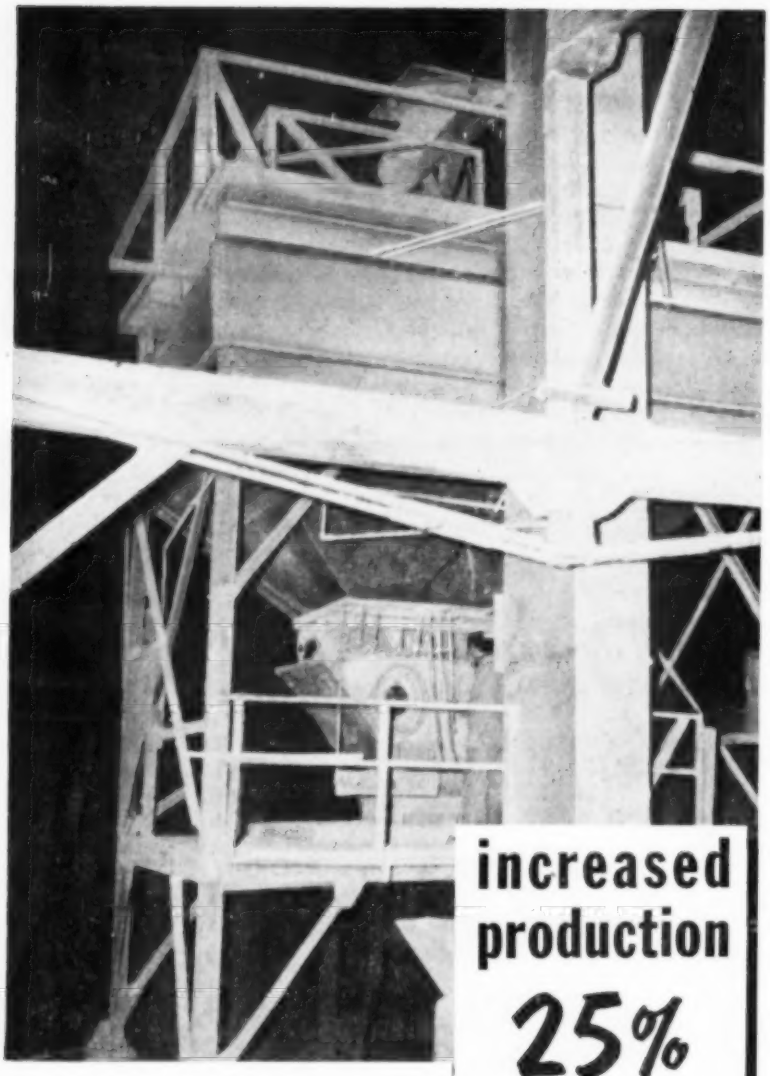

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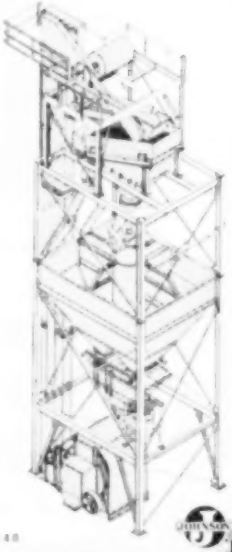

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compound becomes economically attractive for the farmer. The answers to these questions determine what size plant should be built and they may even point out that the size of the market is too small or the necessary selling price too low to consider the chemical further.

If the answers are encouraging, a plant must now be designed so that amount of investment can be calculated and a rate of return on investment determined. Most companies have more projects competing for capital than they have capital available. Rate of return on investment is one means of culling these projects, though judgments as to what individual projects offer in growth of the company must also be considered.

While plans are being made for the commercial fruition of the research project, further development work is necessary. A method, accurate at least to parts per million, must be developed for analyzing the possible residue of the chemical on the harvested edible portions of crops. Crops treated in all proposed fashions and from different locations must be analyzed by such methods. Further toxicological work must be undertaken, such as vapor hazard, skin sensitization, and chronic oral toxicity. Together with residue analyses, these results will indicate whether the chemical is safe both to the consumer of the crop and the persons who use the chemical in the field.

Since wider scale tests have made production of larger amounts of chemical necessary and in order to get information for plant design, the chemical will now be produced in some type of development scale or pilot-plant equipment. Interested workers throughout the country must be made aware of the chemical and of the details of its performance. Many of them will want to examine it for their own purposes and under their own conditions. Probably they will find additional uses for the compound and also its limitations. They may suggest changes in formulation or methods of use that will improve the performance of the chemical.

The biological results must be

summarized and presented to the Production and Marketing Division of the United States Department of Agriculture so that, first, a label for experimental use, and later, commercial registation and labelling can be obtained under the Federal Insecticide, Fungicide, and Rodenticide Act of 1947.

The technical sales force has been busy with the complex problems of packaging, publicizing, and merchandising. The plant has been constructed and is operating and five to ten years after the product has been synthesized it is finally ready for commercial sale.

In an article which appeared in the September, 1952, issue of *Agricultural Chemicals* the author estimated that the average cost per successful chemical of the development steps described in this article is about 1-⅓ million dollars. This cost charges the cost of the average number of unsuccessful compounds against each successful one. In view of the many possible reasons for eliminating compounds described above, it is easy to understand why approximately eighteen hundred compounds are synthesized for each one that achieves commercial success.★★

GRASS INHIBITOR

(*Continued from Page* 47)

of the material is suggested only for established turf areas two or more years of age. Since approximately 24 hours are required for complete absorption of a maleic hydrazide spay, rainfall records within this period will be helpful in a correct interpetation of results.

In the fall of the year, a spray of four to six pounds of MH (10 pounds MH-40) in not less than 40 gallons of water per acre applied to *green* turf, is suggested for best results. It is not necessary to mow the grass after this application.

Similar treatment is suggested for an early spring application of 4 to 6 pounds MH (10 to 15 pounds MH-40) in not less than 40 gallons of water per acre applied to green grass when it is about three inches tall at the start of growth. This is calculated to give results equivalent to fall treatments.

Summer spraying of 4 to 6 pounds MH (10 to 15 pounds MH-40) in not less than 40 gallons of water per acre inhibits grass, but not to the degree resulting from either fall or spring treatment. If mowing is necessary to trim an area, one week after spraying should be allowed to elapse before mowing is made, for absorption and translocation to roots.

Retreatment within the same season can be made after normal grass growth has resumed. No more than two applications in one season are recommended. It should be noted that the presence of broadleaved weeds in plots will require inclusion of 2,4-D as amine salt at locally recommended dosages.

Summary: Application of MH is suggested only for established turf areas, two or more years old. Since approximately 24 hours are required for complete absorption of an MH spray, rainfall records within this period will assist in interpretation of results.

A fall spray of 4 to 6 pounds MH (10 to 15 pounds MH-40) in not less than 40 gallons of water per acre applied to *green* turf is suggested. Mowing after application is not required.

An early spring application at 4 or 6 pounds MH (10 or 15 pounds MH-40) in not less than 40 gallons of water per acre applied to *green* grass when about 3 inches tall at start of growth offers results equivalent to fall treatment.★★

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Zukel, John W.

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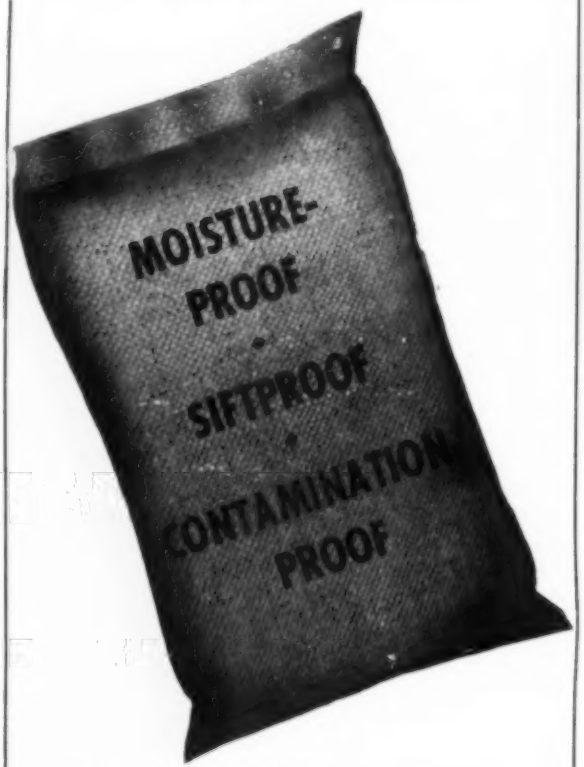

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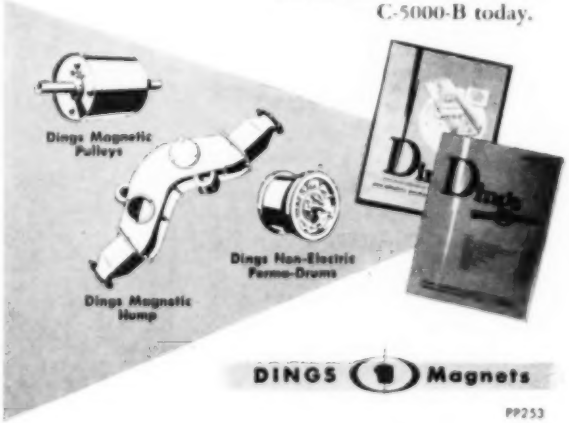

TASTE PANEL

(*Continued from Page 52*)

member cannot learn a particular flavor, it is detected in his training period and he is barred from the panel for that particular material. If panel members are inconsistent in their evaluation, the statistical treatment of their data shows this and their evaluations of the particular samples in question are not included in the panel evaluation.

Statistical treatment of the data also shows whether or not the panel as a whole is reproducing its results in either the duplicate or triplicate testing of a specific sample.

Most of the pesticide evaluation work at Rutgers has been on insecticides in cooperation with the Department of Entomology and experience over a four year period shows that flavor differences can be detected when some insecticides are applied, and in some cases, various levels of application have been differentiated.

During 1951, some flavor evaluation work on fungicides was done in cooperation with the Department of Plant Pathology. Nine fungicide treatments were tested including fixed copper, "Zerlate," "Dithane," "Manzate," and "Orthocide." Tomatoes were the test crop and differences in flavor were detected. However, it is inadvisable to make conclusions on the basis of a one year study. The work on fungicides is being continued.★★

GUEST EDITORIAL

(*Continued from Page 36*)

Short Use Season

THE new chemicals have taken over most of the pesticide business. It has been found that each chemical is more specific than the others against one or two pests, with the result that a number of chemicals are used on a single crop, each to control a specific problem. This means that the use time of each is limited to the proper control time for

Table 1

Cotton

Pest	Season	Use Period (Weeks)
Weeds—Pre-emergence	Spring	0- 3
Boll Weevil	Summer	1-12
Bollworm	"	1-12
Aphids	"	0- 4
Leafworm	"	2- 8
Pink Bollworm	"	2- 8
Spider mites	"	1- 4
Defoliants	Fall	0- 3

Deciduous Fruits

Pest	Season	Use Period (Weeks)
Fungus Diseases	Dormant	2- 4
Scale & Spider Mites	"	2- 4
Codling Moth	Spring & Summer	8-12
Spider Mites	"	2- 8
Plum Curculio	"	6- 8
Aphids	"	0-14
Red Banded Leafroller	"	2- 4
Fungus Diseases	"	2- 8

Vegetables

Pest	Season	Use Period (Weeks)
Aphids	Spring & Summer	0- 8
Caterpillars	Summer	2- 8
Bettles, Weevils	"	0- 8
Spider Mites	"	0- 2
Leafhoppers	"	0- 3
Mildew	"	1-16
Leaf Spots	Summer & Fall	0- 4
Blight	"	2-16

Field Crops

Pest	Season	Use Period (Weeks)
Cutworms, Armyworms	Summer	0- 2
Grasshoppers & Crickets	"	0- 2
Beetles and Weevils	"	2- 4
Cutworms	"	0- 2
Aphids	"	0- 4
Corn Borers	"	0- 4
Wireworms	Spring	1- 4
Fungus Diseases	All	0-16

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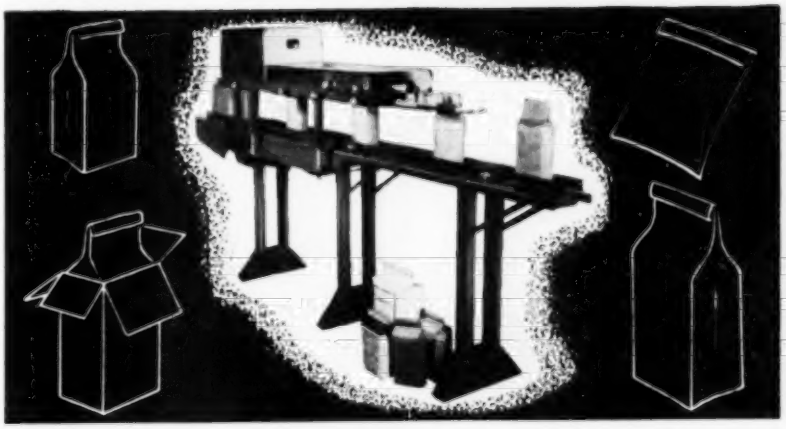

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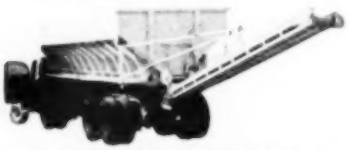

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the particular pest involved. In general, the timing is critical and the use period short. Table 1 shows a few major crops, common pests involved, and the average annual use period for the particular problem in a given area.

To sum up the use period problem, it might be stated that the total annual use period for a single chemical in a specific market area varies from a few days to twelve weeks and that a fair average use period for all pesticides in a given market is about six weeks out of a 52-week year.

Since the seasons vary to some degree in different parts of the country and the timing varies on different crops, the total use period on a national basis is somewhat longer but is still highly seasonal. This does not relieve the distribution and inventory problems within a market area.

Requirement Variations

THE need for pesticides is directly in proportion to the intensity of insect infestations, the amount and severity of fungus problems, the extent of weed growth or the degree of other pest problems. These vary greatly from year to year. Weather is the major controlling factor, in that the severity of freezes, the degree of summer heat, the humidity at critical periods, drought or excessive rainfall tend to regulate the intensity of pest problems. A tremendous amount of work has been done and is still in progress in studying potential infestations for forecast purposes. The USDA takes an active part in this work and publishes the results of its studies to help the farmer and industry better to predict the extent of potential damage. Experience however has shown that changing weather conditions and other factors can completely change conditions so that long range forecasts have many uncertainties. Short range forecasts are more accurate but are of little help to the pesticide industry as plans must be laid out well in advance of the use season.

Another serious factor as to volume of market is that of acreage control restrictions placed by the government. A review of past history indicates that the acreage of some crops now is twice that when under allocation. Another important factor is the probable market value of the crop as the farmers generally elect to use a minimum of pesticides when the apparent crop market value drops.

The variation in demand problem might be summed up as follows:

Cotton—Long range study of requirement figures indicates a variation in the range of ten to one for heavy years compared to light infestation years. In other words, the amount of material needed some years may be only one-tenth that of other years. Since cotton comprises the single largest insecticide market, planning to serve this market is extremely difficult and is fraught with large potential inventory carry-overs.

Fruits—There is not as much variation in total materials needed from year to year for control of fruit pests. However there is a great difference in the intensity of infestation by particular pests and since each pest type requires a special chemical, there often is a very considerable range in the amount of a particular chemical required. The chemical needs for control of fruit pests might be summed up that the total requirements may be 50% more in a year of heavy infestations compared to those of a light year, and that the

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A Dixon, Calif. operator says the PA-18-A puts out "as good or better dust pattern, is more maneuverable, much more economical." While at Miles City, Mont. a PA-18-A owner says his plane "is much better in all respects for our type of work."

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Developed from lessons learned with the thousands of Pipers previously converted to dusters and sprayers, the PA-18-A is the only agricultural airplane in the world now in volume production. It was developed from the famous Piper Super Cub by a special agricultural development division of Piper's engineering department.

Operators all over the world were consulted, their requirements studied. Since then comments and lessons learned in last year's PA-18-A have been incorporated in the new 1953 PA-18-A for even more efficient operation and the most effective dispersal of a wide variety of chemicals at varying coverage per acre.

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With 135 horsepower, the PA-18-A can land and take off where other planes can't operate. High lift flaps give short, heavy-load take offs, slow landings, and excellent downwash for good penetration. A heavy-duty hopper holds 110 gallons of liquid or 18 cubic feet of dust. Dispersal booms for spray or venturi unit for dust are interchangeable giving the plane dual utility. An average swath of 50 feet provides excellent coverage.

Many Safety Features

Safety features, in addition to the PA-18-A's superb climb and maneuverability, include shoulder-harness and wire cutters on the landing gear. The 135 Lycoming engine sets an unmatched standard for dependability. Maintenance and servicing are kept at a minimum to provide excellent reliability.

In addition to wide use in all sections of the United States, the PA-18-A has been put into service throughout the world controlling plagues and helping improve crop yield.

demand range for a single chemical can be on a ten to one basis.

Truck Crops—The comments offered above for fruit crops apply in general to vegetable and truck crops.

Grains (Weed Control)—The weather, particularly the amount of rainfall and the timing of rains, has a great deal to do with weed growth in grain fields. On an average for a particular market, the demand variation may be in the range of five to one depending upon the extent of weed growth.

There are many other crops and usages, but the pattern is similar in all cases.

Pesticide Industry Problems

SINCE under today's conditions the farmer will not purchase his pesticide requirements until he sees the actual need and the dealer and distributor will not stock up until just prior to use time, (and then in cautious amounts) the manufacturer and marketer of insecticides must plan his 52-week year so as to have the right product in the right amount in the marketing area at the right time. He must do this in the face of the unknown volume requirements. This is an extremely difficult job and can never be done perfectly. The best procedure is to study all known factors that may affect the market. Some of these are:

Historic trend of requirements.
Effect of new competitive materials.
Probable crop value.
Changes because of insect resistance.
The effect of experiment station recommendations.
Changes in crop acreages.
Forecasts of infestation intensities.
The amount of carry-over inventory in all trade channels.
General information obtained by continuous close contact with users.

Based on conclusions of such studies, the manufacturer must lay out his 52-week year plans of manufacturing, formulating, packing, shipping and field warehousing. He must plan how much of each chemical in each formulation and each package size to prepare, and as to what quantities of each product by formulation and by size he should ship to each market area at what time. He must make financial plans to carry practically all inventories until shortly before use time. He must be prepared to expect the vagaries of nature to upset the best laid plans and to have to carry over substantial inventories for another year. Sometimes excess inventories in a market area can be reshipped to another or later season but this entails extra costs of handling and shipping which must be weighed against possible losses because of decline in replacement costs and handicaps to his operations because of long tie-up of working capital.

These problems are with us for the 1953 season, and will probably remain with the industry for some time. They now pose a much more serious challenge to management than they have for the past few years.★★

•

Hercules Offers "CMC"

Hercules Powder Co., Wilmington, Del., has announced a new soil conditioner based on a special type of CMC.

The new product will be available this spring. When applied properly, CMC improves the structure of clay soils which tend to crust badly, the company says.

CMC is a cellulose derivative, made by Hercules.

LISTENING POST

(*Continued from Page* 103)

planting; that a preplanting steep in formalin destroyed it and excluded it from the soils; that natural *Fusarium* inhibitors present in the untreated and incompletely fumigated soil held the *Fusarium* in check in the absence of formalin steep; that com-

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plete fumigation destroyed these inhibitors and the resultant absence of the inhibitors in the adequately fumigated soil permitted unhindered development and spread of *Fusarium* introduced on infected bulbs at planting. If this interpretation of the observed facts is correct, it would then appear that the *Fusarium* inhibitors are of biological origin, and furthermore that the inhibitory effect is maintained only in an environment in which the living organism or organisms produce the inhibiting substance.

As mentioned previously, an interpretation of the significant varietal difference for bulb survival is invalidated because of different planting rates. The significant interaction effect variety x bulb treatment, however, does appear to be real (Table 2), since the effect of formalin treatment in Wedgewood is more marked than it is with Imperator. As further evidence, bulb rot, due largely to *Fusarium* and developing during the subsequent storage period, amounted to 52 percent for Imperator and 28 percent for Wedgewood, with a required least significant difference at the .01 level of 7.47. This would tend to indicate that Imperator was more susceptible to *Fusarium* than Wedgewood, but not unequivocally so, since the previous history of the two stocks was not of a parallel nature. The significance, therefore, of the interactive effect involving iris variety and bulb treatment cannot be stated with certainty with the present data.

According to this study, soil populations (based upon disease incidence) of *Sclerotium solfsii* can be reduced by fumigation with chlorobromopropene. Evidence was also obtained indicating that thorough soil fumigation in some instances may be harmful when inadvertently a second disease-producing organism is introduced.

DDT-BORDEAUX

(*Continued from Page 39*)

of DDT and bordeaux mixture cause economic damage to Concord grapes? And if so, are the early season sprays of bordeaux mixture and DDT more injurious than late season applications? And, what is the effect of DDT and ferbam and DDT and a low soluble copper on the growth and yield of Concord grapes?

Before the experiments were started, the grape vines in the experimental vineyard were pruned during the winter of 1951. The number of buds for each individual count vine were adjusted according to the pruning scale described previously. A graphic summary of the pruning data is shown in chart 1. The apparent differences in prunings for the various treatments before the spraying tests were started are not significant.

Fruit yield records for 1951 were secured from each of the count vines in each plot in the experimental vineyard. Fruit yields from young vines producing less than 5 pounds of fruit were not included in the results. A graphic summary of the yield data calculated on an acre basis (approximately 600 vines per acre with a spacing of 8 by 9 feet) is shown in chart 1. Examination of these data will reveal that treatment No. 4, which received three applications of DDT and bordeaux mixture, and treatment No. 2, receiving three sprays of bordeaux mixture, yielded less fruit per acre than any of the other treatments. Although these data indicate that sprays of bordeaux mixture alone and in combination with DDT reduce the yield of Concord grapes, the differences for the season of 1951 were not significant.

The spray tests were repeated in the experimental vineyard during the season of 1952. The amount of vegetative growth made by the vines, following one season's spraying, was determined by making a record of the prunings removed from each individual count vine. Data are expressed as the average pruning weights in pounds per vine for each treatment. These data are presented in chart 2. An examination of the data will show that less growth was made by vines treated with sprays of bordeaux mixture (treatment No. 2) and sprays of DDT and bordeaux mixture (treatment No. 4). The reduction in pruning weights (1951-1952) for the

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vines treated with bordeaux mixture alone were 25 percent.

When DDT was added to the bordeaux mixture spray, the pruning weights dropped 34 per cent. The greatest growth was made by those vines treated with DDT and ferbam (treatment No. 5). Only in the case of the vines treated with bordeaux mixture, and DDT and bordeaux mixture, were the differences significant. It is interesting to note that one application of DDT and bordeaux mixture applied in late July, following two early sprays of DDT and ferbam, did not reduce the vegetative growth of Concord grape vines (treatment No. 6). Sprays of DDT alone (treatment No. 3) and sprays of low soluble copper and DDT (treatment No. 7) did not retard the growth of the vines.

Data on fruit yields are given for all the count vines in the test plots that produced 5 pounds or more of fruit. Yields from young vines in the vineyard were considered too light and erratic for use. A summary of the yields for 1952, calculated on an acre basis, (approximately 600 vines per acre with a spacing of 8 by 9 feet) is shown in chart 2. An examination of these data will reveal that the lowest yields of fruit were obtained from vines treated with bordeaux mixture (treatment No. 2) and DDT and bordeaux mixture (treatment No. 4). Grape vines sprayed with DDT and bordeaux mixture produced 2.7 tons of fruit per acre. Those sprayed with bordeaux mixture alone yielded 3.5 tons of fruit per acre. The differences in yields of the vines treated with bordeaux mixture alone and DDT and bordeaux mixture were significant.

The highest yields were obtained from those vines treated with DDT and ferbam (treatment No. 5). However, only in the case of the vines sprayed with bordeaux mixture, and DDT and bordeaux mixture, were the differences significant. It may be seen that one spray of DDT and bordeaux mixture (treatment No. 6) applied in late July following two early sprays of DDT and ferbam did not reduce the yield of fruit. The yield records indicate that sprays of DDT alone (treatment No. 3) and sprays of DDT and low soluble copper (treatment No. 7) did not reduce the yield of fruit.

To secure additional information on the effect of various spray programs on Concord grapes, records were made on the size of the berries and clusters and the number of clusters per vine. These data are shown in table 2. An examination of the data will reveal that the smallest berries and clusters and the least number of clusters per vine were obtained from vines treated with bordeaux mixture and DDT and bordeaux mixture. Although differences are apparent with other treatments, only in the case of those vines sprayed with bordeaux mixture, and DDT and bordeaux mixture, are the differences significant.

No significant differences in the percentage of soluble solids were evident in the harvested fruit from the experimental plots.

THE grape berry moth and grape leafhopper were of no economic importance in the test vineyard. Powdery mildew was present in the experimental vineyard but was of small economic importance. Observations indicate that sprays of ferbam were of little or no value in the control of powdery mildew. Sprays of bordeaux mixture and low soluble copper appeared to keep the mildew well under control.

Summary: Although the tests encompass a period of only two years, the data presented on vine growth and fruit yields indicate that sprays of bordeaux mixture alone and sprays of DDT and bordeaux mixture, retard the vegetative growth of the vine and reduce the yield of grapes. Sprays of bordeaux mixture also reduce the size of the berries and clusters and the number of clusters per vine. After one season's spraying, the average pruning weights per vine for the DDT and bordeaux mixture-treated vines were 0.8 pound less

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than for those vines that received DDT and ferbam. In 1952, grapes sprayed with DDT and bordeaux mixture yielded 1.6 tons less fruit per acre than grapes treated with DDT and ferbam. Although sprays of bordeaux mixture alone retard the growth of the vine and reduce the yield of fruit, it appears that the addition of DDT to the bordeaux spray increases the damage further. There were no significant differences in the pruning weights or yields of fruit from grapes treated with the following spray programs: no spray, sprays of DDT alone, sprays of DDT and ferbam, sprays of DDT and ferbam in the 1st and 2nd applications, followed by one application of DDT and bordeaux mixture in late July, and sprays of DDT and low soluble copper and lime.

Field observations indicate that sprays of bordeaux mixture injure the foliage of Concord grapes. However, the visible injury is not pronounced until the latter part of September and at this time of the season the fruit is well along to maturity. The data indicate that early season applications of bordeaux mixture are more injurious than late applications. Since leaf injury is not apparent until the latter part of September, together with the fact that a late season spray of bordeaux mixture does not appear to retard the growth of the vine nor reduce the yield of fruit, it would seem that sprays of bordeaux mixture inhibit the food manufacturing ability of the leaves even though no apparent injury is evident.★★

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TECHNICAL BRIEFS

(*Continued from Page 98G*)

between the three methods of application.

The principal advantages of low gallonage spraying over dusting are that it is probably a little cheaper and the operator is less restricted by weather conditions. For best results with low gallonage spraying, the machine should be operated at a pressure of 80 to 100 pounds per square inch and it should be adjusted to apply about 25 gallons of solution per acre. Four nozzles are used per row. Two of these are mounted in the boom and are directed downward toward the tops of the plants. The other two are mounted in drop pipes and are adjusted so that the spray is directed upward toward the under-surface of the leaves from both sides of the row.

For spraying broccoli before the heads are formed, a combination of 1 quart of 25 per cent DDT emulsion and either 1 pint of 25 per cent parathion emulsion or ½ pint of 40 per cent TEPP per acre is suggested. After the heads begin to form and during harvest, the use of 1 pint of 40 per cent TEPP is very effective against aphids. If caterpillars are prevalent, they can be controlled by substituting 1 quart of parathion emulsion for the TEPP in one or more applications.

In most seasons two or three applications at 2-week intervals are required before the heads begin to form. After the heads are formed and during harvest four to six applications are necessary. If the cabbage aphid is only moderately abundant, an interval of 10 days between applications is usually adequate. If this insect is prevalent, it will be necessary to shorten the interval between applications to 7 days.

—From "Insect-Free Broccoli," by G. E. R. Hervey, New York Agricultural Experiment Station, Geneva, N. Y., in Farm Research, Vol. XIX, No. 1 January, 1953.

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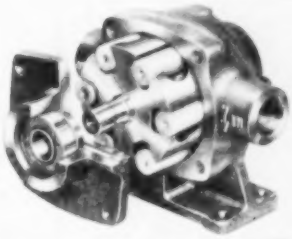

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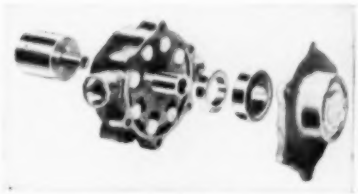

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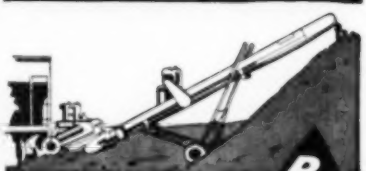

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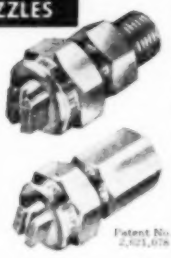

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Dr. E. R. de Ong
Consultant
Entomology — Pesticides
Legal Service
Author of
Insect, Fungus & Weed Control
Chemistry & Uses of Insecticides
926 Stannage Ave., Albany 6, Calif.

Calif. Weed Conference

Marcus E. Cravens, deputy Agricultural Commissioner, Santa Barbara County, Santa Barbara, Calif., was elected president of the California Weed Control Conference at the group's Fifth Annual Meeting held recently at San Jose, Calif.

Other officers named at the meeting are as follows: vice-president, Lester J. Berry, county Director of Extension, Shasta County, Redding, Calif.; treasurer, Paul F. Dresher, American Chemical Paint Co., San Jose; secretary, R. N. Raynor, Dow Chemical Co., San Francisco. Mr. Raynor was re-elected.

The meeting itself covered many phases of weed control, including problems of the commercial operators; local weed problems and a panel discussion on "What's New in Weed Control." Speakers on the program included A. S. Crafts, University of California, Davis; Dale E. Wolf, E. I. duPont de Nemours & Co., Inc., Wilmington, Del.; and Virgil H. Freed, Oregon State College, Corvallis.

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Index to ADVERTISERS

Agricultural Chemicals, Inc. 117
American Cyanamid Co. 34
American Agricultural Chemical Co. ..... Feb.
American Potash & Chem. Corp. 65, 68
Anderson, Carl N. 159
Andrews, W. R. E. Sales, Inc. 123
Antara Chemicals, Division of General Dyestuff Corp. 98C
Armour & Co. 28
Ashcraft-Wilkinson Co. 8, 30
Atlas Powder Co. 14
Attapulgus Clay Co. 4

Baker H. J. & Bro. 66
Bagpak Division, International Paper Co. 18
Barber-Greene 156
Barclay Chemical Co. 160
Baughman Mfg. Co. 146
Bemis Bro. Bag Co. ..... 3rd Cover
Berkshire Chemicals, Inc. 156
Berkeley Chemical Corp. 131
Betner, Benj. C. Co. ..... Feb.
Butler Mfg. Co. 17

Calabrian Co. ..... Feb.
California Spray Chem. Co. 126
Carbide & Carbon Chemicals Co. 120
Chase Bag Corp. ..... Feb.
Chemagro Corp. 128
Chemical Insecticide Corp. 158
Calcium Carbonate Corp. 76
Chemical & Industrial Corp. 10
Chemical Construction Corp. ..... Feb.
Chem. Corp of Colorado 130
Cohutta Talc Co. 160
Columbia Southern Chemical Corp. 80
Combustion Engineering-Superheater, Inc., Raymond Pulverizer Div. 98D
Cox, Dr. Alvin J. 159

Davies Nitrate Co., Inc. 154
Davison Chemical Corp ..... Feb.
de Ong, Dr. E. R. 159
Diamond Alkali Co. 16
Dings Magnetic Separator Co. 144
Dow Chemical Co. 134
du Pont de Nemours & Co. E. I. 24, 25
Duval Sulphur & Potash Co. 8

Eastman Chemical Products, Inc. 15
Edco Corp. 118
Emulsol Corp. 122
Ethyl Corp. 100

Faesy & Besthoff, Inc. 160
Fishbein Co., Dave 154
Flag Sulphur & Chemical Co. 147
Floridin Co. 83
Fry Co., Geo. H. 145
Fulton Bag & Cotton Mills 72

Geigy Co. 22
General Chemical Division, Allied Chemical & Dye Corp. 82
General Industrial Development Corp. 98F
Georgia Talc Co. 150
Glendon Pyrophyllite Co. 149
Goodrich Chemical Co., B. F. 138
Greeff & Co., R. W. 154

Hammond Bag & Paper Co. 79
Heckathorn & Co. 146
Highway Equipment Co. 106
Hercules Powder Co. ..... 9, 4th Cover
Huber, J. M. Corp. 127
Hudson Pulp & Paper Corp. ..... Feb.
Hypro Engineering, Inc. 155

Industrial Marking Equipment Co. 156

Jaite Co. 94
Johns-Manville Co. 21
Johnson, C. S. Co. 142

Kolker Chemical Works, Inc. 16
Kolon Trading Co., Inc. 154
Koppers Co. ..... Feb.
Kraft Bag Co. ..... Feb.

Lancaster, Allwine & Rommel 160
Lion Oil Co. 92

Marietta Concrete Corp. ..... Feb.
Dr. C. C. McDonnell 159
Marathon Corp. 98
Mathieson Agricultural Chemicals Company 78
McLaughlni Gormley King Co. 135
Mente & Co. 144
Michigan Chemical Corp. 12
Mine Safety Appliances Co. 156
Monsanto Chemical Co. 19, 75

National Agricultural Chemicals Ass'n. 140
National Aniline Division, Allied Chemical & Dye Corp. 96, 102
Naugatuck Chemical Division, U. S. Rubber Co. 98H
Niagara Chem. Div. Food Machinery & Chem Corp. ..... Feb.
Ninol Laboratories, Inc. 23
Nitrogen Division, Allied Chemical & Dye Corp. ..... Feb.
Nopco Chemical Co. 136

Oberdorfer Foundries, Inc. ..... Jan.

Pacific Coast Borax Co. 88, 110
Penick, S. B. & Co. 29
Pennsylvania Industrial Chemical Corp. Dec.
Pennsylvania Salt Manufacturing Co. 32
Phelps Dodge Refining Corp. 133
Philgo Chemical & Products Corp. 125
Phillips Chemical Co. 70
Pioneer Chemical Associates 141
Pioneer Pyrophyllite Corp. 160
Piper Aircraft Corp. 148
Pittsburgh Agricultural Chemical Co. a Division of Pittsburgh Coke and Chemical Co. 90
Pittsburgh Plate Glass Co., Corona Division 124
Potash Company of America 3
Poulsen, A. E. & Co. 67
Powell, John & Co. ..... 2nd Cover
Prentiss Drug & Chemical Co. 152
Private Brands, Inc. 151

Raymond Pulverizer Division, Combustion Engineering-Superheater, Inc. 98D
Republic Steel Corp. 132
Riedeburg, Theodore Associates 159
Rodgers, George G. Co. 158
Richardson Scale Co. 104
Rohm & Haas Co. 11

Sherwin-Williams Co. 108
Southeastern Clay Co. 137
Southwest Potash Corp. ..... Dec.
Spencer Chemical Co. ..... Feb.
Spraying Systems Co. 158
Shell Chemical Co. 84
Standard Agricultural Chemicals Inc. 73
Stauffer Chemical Co. 98A
Sturtevant Mill Co. 112
Summit Mining Corp. 143

Tennessee Corp. 31, 114
Tennessee Products & Chemical Corp. 69
Texas Gulf Sulphur Co. ..... Feb.
Thompson Chemicals Corp. 115
Thompson, Friar M. 159
Thompson-Hayward Chemical Co. 116
Titlestad, Nicolay Corp. ..... Jan.
Tobacco By-Products & Chemical Corp. 74
Townsend, Dr. G. R. 159

Union Bag & Paper Corp. 6, 7
Union Special Machine Co. ..... Feb.
United Chemical Co. 146
U. S. Industrial Chemicals Co. 26
U. S. Potash Co. 77
U. S. Steel Corp. 81

Vanderbilt Co., R. T. 33
Varley & Sons, Inc., James 13
Velsicol Corp. 20
Virginia-Carolina Chemical Corp. 74

Whittaker, Clark & Daniels, Inc. 157
Williams Patent Crusher & Pulverizer Co. 27
Willson Products Inc. 159
Wilson Organics, Inc. 129
Wisconsin Alumni Research Foundation ..... Feb.
Woodward & Dickerson, Inc. 150
Worthington Corp. 71
Woudhuysen, H. L. & Associates 152
Wyandotte Chemicals Co. ..... Dec.

Young Machinery Co. 153

The industry meeting calendar, usually found on this page, appears on page 113 this month.

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

Tale Ends

THE use of herbicides was discussed on two separate nationwide radio programs recently, by gentlemen who know the subject well.

On January 31, the National Farm and Home Hour program carried the voices of Dr. C. E. Minarik, past president of the Northeastern Weed Control Conference and Dr. Warren C. Shaw, chairman of the Publication Committee of the same conference. They reviewed highlights of their 1953 meeting (New York, January 5-7) giving their listeners good, authentic information on the subject.

On the same program two weeks later, the control of weeds in cotton was discussed over the NBC network by Dr. R. L. Lovvorn, head of the Division of Weed Investigations, Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S.D.A.; E. R. Stamper, agronomist, Louisiana State University, Baton Rouge; O. B. Wooten, agricultural engineer, Mississippi State College, and Claude Welch, National Cotton Council, Memphis, Tenn.

People in the herbicide industry will be happy to know that such authentic information is getting to the public, some of whom apparently still regard the use of chemicals in agriculture as threatening the well-being of the country.

•

"What's in the Bag" is a question which a Texas housewife wishes she had asked herself when the time came for her to prepare her garden recently. Her husband, Burman Black, intent on having a fine garden, purchased a bag of commercial fertilizer and stored it in the garage. Mrs. Black, going ahead with the project, took a bag from the garage, carefully mixed its contents with the soil in the garden, did her planting, then gave it a good soaking with the hose.

Next morning they could have used the garden as the floor for another garage. The "fertilizer" she had used turned out to be cement, which had also been stored in the garage.

•

That selling fertilizer materials by the bucketful is illegal in New Jersey, is a fact probably long to be remembered by Walter Schlatmann, Jersey City, who was fined recently for peddling "lawn fertilizer" in these quantities. Judge Irving S. Reeve gave the offender a choice of 30 days in jail or a $50 fine.

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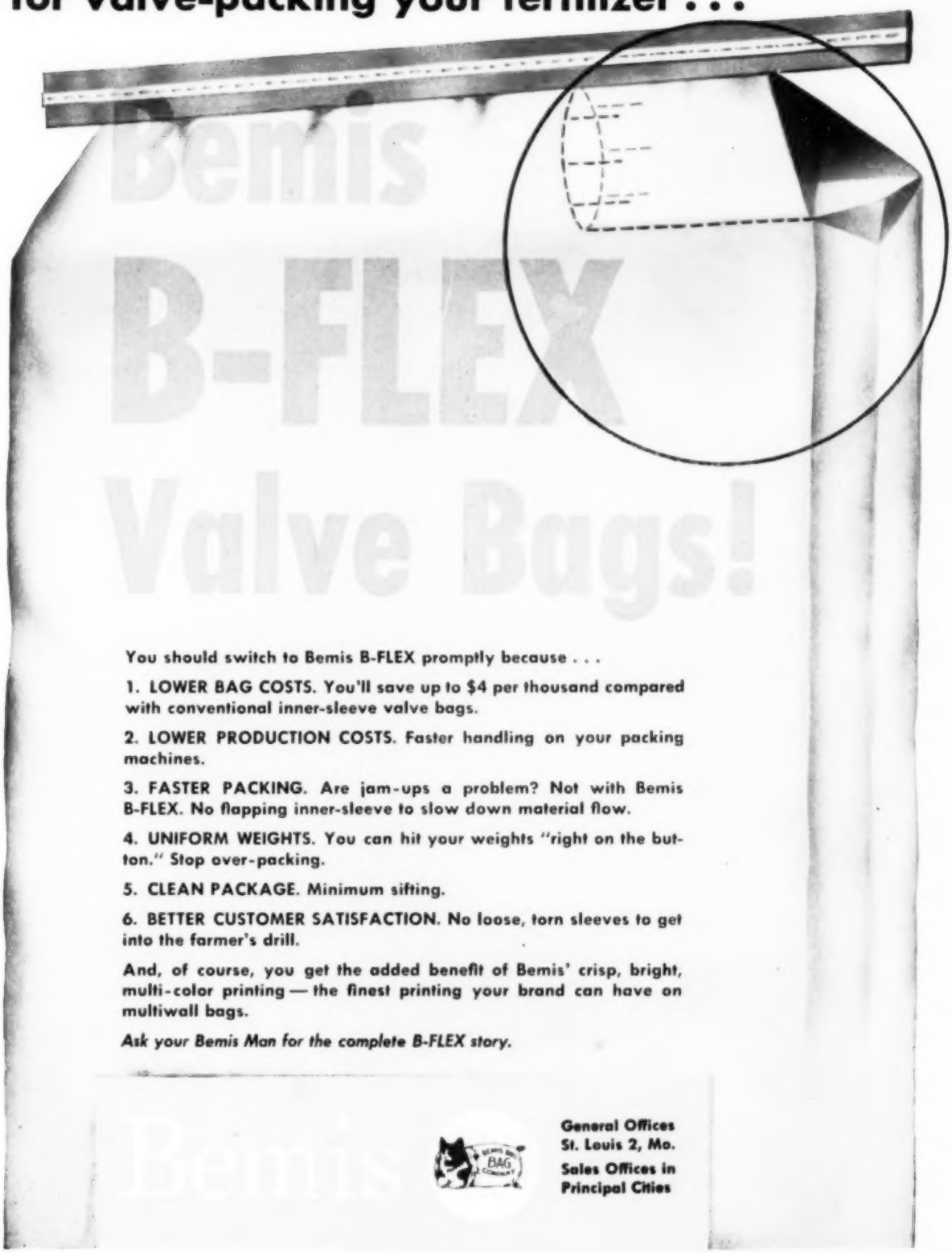

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